HORTICULTURAL ABSTRACTS

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To facilitate quicker reference from the index to articles noted but not abstracted, lists of such articles will be grouped as before under one number at the end of each section, but these numbers will be subdivided alphabetically, e.g. 1406a to 1406j, 1658a to 1658z, 1659a to 1659d.
Initialled abstracts and reviews are by H. C. Chapelow, R. J. Garner, E. S. J. Hatcher, A. P. Preston, J. P. R. Riches and H. M. Tydeman of the East Malling Research Station and by G. St.Cl. Feilden, late of the Bureau.

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N.B.—Numbers subdivided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS

General.

1367. CRÉPIN, C. 633/635
Rapport sommaire sur les travaux poursuivis en 1941 par les stations d'amélioration des plantes. (Summary of the work done in 1941 at the French Plant Improvement Stations.)
Ann. agron. Paris, 1942, **12**: 633-69.
The report includes not only work ordinarily carried out at the French Stations of Versailles, Antibes, Bordeaux, Clermont-Ferrand and Rennes but also investigations on flax and the oil plants colza, turnip, poppy, sunflower and soya. A note was made as regards Antibes that the study of rootstocks for apples, pears and plums in the South of France was being continued, and that the collection of figs at Grasse, and of citrus and grapes at Antibes had now been completed with a view to the compilation of a monograph on these species.

1368. (INSTITUTE OF GRAIN HUSBANDRY SOUTH-EASTERN U.S.S.R.) 633/635(47)
Collated plan of research for 1943 at the Institute of Grain Husbandry of the South-Eastern U.S.S.R. and its subsidiary stations. [Russian.]
Bull. Inst. Grain Husb. S.E.U.S.S.R., 1943, No. 1, pp. 5-20.
Each of the 32 sections into which this bulletin—the first of a series to replace the Journal of the Institute, no longer published—is divided, covers a particular aspect of agricultural research, and contains a succession of very brief references of sufficient length only to indicate the kind of work to be, or being, done at the Institute, and its subsidiary stations. Among such references, many have a bearing on the cultivation and general management of plants of horticultural, medicinal, and industrial value, such as sunflowers, legumes, mustard, safflower, rubber plants, fibre plants, and others.

1369. KOLJASEV, F. E. 63(47)
The work of the Physico-Agronomical Institute during the war. [Russian.]
Priroda (*Nature*), 1944, No. 3, pp. 84-6.
The Physico-Agronomical Institute situated in the Molatov Province [Urals], has been engaged since 1941 on urgent practical problems bearing upon the increase of agricultural production. The following, among others, formed the subject of exhaustive study: (*a*) combating the damage caused by early spring and autumn frosts to cereal and vegetable crops; (*b*) rational construction of vegetable and potato stores; (*c*) special methods of soil moisture conservation; (*d*) planting tall-growing plants together with spring crops to preserve soil moisture content and to improve microclimate, and (*e*) efficient utilization of such products as straw, etc.

1370. ANON. 632.95: 631.521
Plant eugenics.
Gdnrs' Chron., 1945, **118**: 59.
In the author's view it is a grave mistake of modern plant protection methods to concentrate on the chemical destruction of pests and diseases instead of realizing that " health

is a product of genetical structure and environment". Plant protection is, therefore, regarded as primarily a biological problem. The role of chemistry should be to discover the chemical difference between the immune and the susceptible plant rather than to search for lethal chemicals.

1371. SCHMITT, H. G. 581.02
Experimentelle Pflanzenpsychologie. Einige Ergebnisse über das Verhalten der Pflanzen. **(Experimental plant psychology. Observations on plant behaviour.)**
Forschungsdienst, 1944, **17**: 515-20.
The article is an extract from a detailed paper by the author published elsewhere, *Mimosa pudica* serving as the test plant.

1372. FEDČENKO, B. A. 582.9
Investigators of the flora of Iran. [Russian.]
J. Bot. U.R.S.S., 1945, **30**: 31-43.
The names of Russian and other investigators are arranged in alphabetical order, and include a few of those who lived in ancient times, and also of those still living. Under each name some information is given regarding the person concerned, and in some cases it includes the routes followed and the names of places visited, plants of particular interest found (both useful and ornamental), the size of the collection made and where it is now to be found.

1373. VON REGEL, C. 633/635(4)
Pflanzen in Europa liefern Rohstoffe. **(Raw materials from European plants.)**
E. Schweizerbart, Stuttgart, 1944, pp. 294, RM. 14—, from review *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 21.
The aim of the book is to show that Europe could become more independent of imports from other continents by using the natural resources of her flora and by developing (through breeding) new types of cultivated plants from certain wild plants.

1374. ROMERO, A. G. 631.531
Cifras medias relatives al peso y volumen de las semillas de las principales plantas cultivadas. **(Tables of average weights and volumes of the seeds of the chief cultivated plants.)**
Publ. Minist. Agric., Secc. Publ. Prensa y Propaganda, Madrid, 1942, pp. 22.
An introductory note is followed by tables and graphs to show the relation between weight and volume of the seeds of nearly 100 cultivated plants.

1375. ČERNOV, V. K. 633.88
Ecological observations on *Frustulia rhomboides* var. *saxonica* (Rabh.) de Toni. [Russian.]
Sovetsk. Botan., 1944, Nos. 4-5, pp. 77-81.
These investigations, carried out in the region of Kandalakša, were in response to the needs of optical manufacture. Large quantities of diatomaceous material were required in connexion with the making of microscopes.

Nutrition.

1376. MILTHORPE, F. L. 631.8
The function of mineral elements in plant nutrition.
J. Aust. Inst. agric. Sci., 1945, **10**: 122-8, bibl. 34.
The present state of our knowledge on the function of mineral elements essential for plant growth is briefly summarized.

1377. ERLIJMAN, M. 631.67
Influencia del agua de riego sobre los suelos en la zona Cuyana. **(The effect of the water of irrigation on the soils of the Cuyo zone.)**
Rev. B.A.P., 1945, **28**: 331: 11-23.
The river water in the region contains a relatively high percentage of sulphate of calcium. When used for irrigation the calcium tends to be thrown out of solution and it accumulates as calcium carbonate in the lower layers of the plantation soil and as sulphate of calcium (gypsum) in the upper layers, thus adversely affecting the soil conditions. Tables are given of the chemical analysis of the irrigation waters in the areas concerned.

1378. BERTRAND, G. 581.192: 546.27
Recherches sur la répartition du bore dans les espèces végétales. **(Boron content in different plant species.)**
Ann. agron. Paris, 1941, **11**: 1-6, bibl. 6.
Analysis of some 120 plants made at blossoming time indicates in general a striking relation between the amount of boron in the plants and their place in the botanical natural orders. The most interesting fact established is that monocotyledons contain as a class much less boron than dicotyledons and in this respect the cereals are particularly noticeable. Among the 57 plants, the boron analysis of which is here tabulated, the lowest and highest values are given among the monocotyledons (10 plants) by perennial rye grass 2·9 mg. per kg. dry matter and Solomon's seal 4·4 mg., and dicotyledons (47 plants) by thistle 8·0 mg. and lucerne 28·7 mg. It is, however, noticeable that whereas some species appear to contain approximately equal amounts of boron wherever they are grown, e.g. lucerne, others, such as dandelion, vary greatly according to environment.

1379. BERTRAND, G. 546.27: 581.192
Recherches sur la teneur en bore des graines. **(Boron content of seeds.)**
Ann. agron. Paris, 1942, **12**: 189-92, bibl. 2.
The author tabulates his boron analysis of the seed of 42 different plants belonging to many natural orders, the boron content varying from about 7 to 20 mg. per kg. dry matter. It is interesting to note that the relation between boron content and the place of the plant in the natural orders found in analysis of whole plants (see previous abstract) is here somewhat, though not entirely, masked. But, despite this masking, seeds of the *Gramineae* always show least boron while those of the *Papilionaceae* and *Cruciferae* are generally well provided. Another noticeable discovery is that in those species which are relatively rich in boron the seeds contain significantly smaller percentages than the rest of the plant, while the seeds of those poor in boron contain relatively more boron than the rest of the plant.

1380. BOBKO, E. V., AND SHENURENKOVA, N. P. 581.14: 546.23
Effect of selenious and selenic acids on development of plants.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 115-6.
The tabulated data show (1) that selenium is more toxic to plants grown in sand than to plants grown in soil, and (2) that selenium compounds with a lower degree of oxidation are more poisonous than highly oxydized compounds. Millet and alfalfa served as test plants.

1381. DROUINEAU, G., AND GUÉDON, A. 631.416.8
Sur une méthode rapide de dosage du magnésium échangeable. **(A rapid method of determining exchangeable magnesium in the soil.)**
Ann. agron. Paris, 1943, **13**: 177-83, bibl. 11.
The authors describe a semi-micro, colorimetric method of determining magnesium, which can be applied to a given quantity of the solution obtained in the extraction of the exchangeable bases by ammonium acetate. The conditions under which magnesium hydroxyquinoleinate was redissolved and the elaboration of the green complex formed by the hydroxyquinoleine with iron are also set out. Methods of eliminating calcium by means of ammonium oxalate are considered.

1382. BERTRAND, G. 581.162.3: 581.192: 546.46
Sur la présence actuellement contestée du magnésium dans les grains de pollen. **(The disputed presence of magnesium in pollen grains.)**
Ann. agron. Paris, 1940, **10**: 339-48, bibl. 14.
The author, basing his statements on his own work and that of others, refutes the findings of Elser and Ganzmüller that pollen grains do not contain a certain amount of magnesium. He indicates the probable error into which they fall. His contention is given strong support by analysis of pollen from maize, flax, date palm, pine, alder and definitely, but not quite so obviously, from walnut.

1383. PLANT, W., JONES, J. O., AND NICHOLAS, D. J. D. 632.19: 581.192
The technique of chemical tissue tests. Progress report I.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 79-84, bibl. 7.
In co-operation with Stoughton and Fawcett a technique of chemical tissue tests has been worked out at Long Ashton for use in field or laboratory. In this paper methods are described for the extraction and evaluation of nitrate, phosphate, potassium, calcium, magnesium and chloride and, under certain conditions, for manganese, iron and zinc.

Physiology.

1384. THORNTON, N. C. 631.531
Importance of oxygen supply in secondary dormancy and its relation to the inhibiting mechanism regulating dormancy.
Contr. Boyce Thompson Inst., 1945, **13**: 487-500, bibl. 41.
Some facts and theories regarding the development, the continuation and the breaking of secondary dormancy in seeds are reviewed in the light of the pertinent literature. It is believed that the phenomenon of dormancy, primary and secondary, is induced by the inhibitory effect of accumulated, intermediate products formed by partial anaerobic respiration in the absence of a sufficient oxygen supply. Certain factors governing the oxygen supply to the seed are discussed in detail.

1385. KRAMER, P. J. 581.11
Absorption of water by plants.
Bot. Rev., 1945, **11**: 310-55, bibl. 273.
The principal conclusion reached from a review of the literature is that active—as against passive—absorption cannot supply more than 5% of the water required by a rapidly transpiring plant and must therefore be regarded as of negligible importance in maintaining the water balance. The rate of absorption of water in moist soil is determined primarily by rate of transpiration. It is less affected by the extent and efficiency of the root system. Important environmental factors are available soil moisture, concentration of soil solution, soil aeration and soil temperature.

1386. RICHTER, A. A., SUKHORUKOV, K. T., AND OSTAPENKO, L. A. 581.13: 581.14
Photosynthesis and development of plants.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 40-1, bibl. 4.
Experiments with a number of agricultural and horticultural plants indicate that the assimilation of CO_2 and the liberation of O_2 in a leaf are independent of the developmental stage of the plant and that there is no correlation between the leaf and the reproductive organs.—Laboratory for Photosynthesis.

1387. RICHTER, A. A., SUKHORUKOV, K. T., AND OSTAPENKO, L. A. 581.13: 581.14
Photosynthesis and growth.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 165-7, bibl.
The initial stages of photosynthesis, including carbon dioxide absorption and its reduction under evolution of oxygen, were found to proceed independent of growth processes and organic matter distribution. Test plants were again a number of agricultural and horticultural plants examined under a variety of conditions.—Laboratory for Photosynthesis.

1388. RICHTER, A. A., SUKHORUKOV, K. T., AND OSTAPENKO, L. A. 581.13: 581.14
Co_2 assimilation in growing organs.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 299-300, bibl. 4.
The photosynthetic activity of leaves in different positions of decapitated and normal sunflower plants is compared and the conclusion is reached (1) that photosynthesis begins to function at an early stage of leaf development, (2) that photosynthesis is only slightly affected by other processes taking place in the leaf. The structure of the young stem is shown to favour the assimilation of CO_2 produced by respiration and available in the intercellular spaces, while the absorption of atmospheric CO_2 by the stem is impeded by the cuticle of the epidermis and the scarcity of stomata.—Laboratory for Photosynthesis.

1389. RICHTER, A. A., SUKHORUKOV, K. T., AND OSTAPENKO, L. A. 581.13
State of the leaf and photosynthesis.
C.R. Acad. Sci. U.R.S.S., 1945, **47**: 67-70, bibl. 8.
Of several conditions analysed, only prolonged shade and visible senescence were found to affect the photosynthetic capacity of sunflower, maize and tobacco leaves.

1390. LEACH, W., MOIR, D. R., AND BATHO, H. F. 581.12
An improved arrangement for the measurement of carbon dioxide output of respiring plant material by the electrical conductivity method.
Canad. J. Res., 1944, **22**, Sec. C, pp. 133-42, bibl. 11.
An apparatus is described and illustrated for recording respiratory CO_2 output of plant material. It comprises an oscillator, amplifier and vacuum tube voltmeter that work in conjunction with a special type of absorption tube. N/10 NaOH solution is used as the absorbing reagent. [From authors' abstract.]

1391. GREULACH, V. A. 581.035
"Photoperiodism" versus "photoperiodicity".
Science, 1945, **101**: 353-4, bibl. 9, being *Contr. Sci. Div. Univ. Houston* **87**.
Reasons are given why the term "photoperiodicity", as used by zoologists, should be abandoned in favour of "photoperiodism" as originally proposed and later employed by botanists.

1392. GREBINSKIĬ, S. O. 581.05
Physiological and biochemical peculiarities of mountain plants. [Russian.]
Uspehi Sovremennoi Biologii (Advances in modern biology), 1944, **18**: 165-93.
Plants growing at high altitudes adapt themselves to a rare atmosphere, to cold, to rapidly alternating temperatures, a high degree of moisture and strong solar radiation. Such conditions constitute a severe test to which the plants react by means of biochemical and physiological modifications, of which advantage may be taken when it is proposed to cultivate crops at high altitudes. Many of the constituents for which crops are grown were found to increase in amount under mountain influence.

1393. TINT, H. 581.084.1
An apparatus for the growth of plants under controlled temperature levels.
Phytopathology, 1945, **35**: 511-6.
An apparatus is described and illustrated which permits the investigation of plant development simultaneously at several

levels of temperature. It allows temperatures in separate compartments to fluctuate within their respective levels in a manner resembling the normal diurnal range of temperature in the field under the influence of varying degrees of insolation. The cost of the material is relatively low and subsequent maintenance expenditures are negligible. [Author's summary.]

Climate.

1394. OSMOND, D. A. 551.5(42)
Agricultural "weather" regions of England and Wales. The integration of summer rainfall and temperature data.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 213-8, bibl. 2.

The method of arriving at so-called weather regions, determined by the integration of mean monthly rainfall and mean monthly air temperatures, is described, and a map is given showing the division of England and Wales into 28 of such regions.

1395. OSMOND, D. A. 631.44
An index for use in the regional classification of land for agricultural purposes.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 219-24.

An index is proposed, based on important objective characters affecting agricultural utilization of land. There are four factors concerned, namely site, soil, climatic and development factors. The development factor is used to signify the influences both of man's activities and of such natural phenomena as are not included in the first three factors. Thus a region may be excellently sited, have a first class soil and a good climate and yet owing to, say, smoke damage from industry or the presence of natural forest be of very low value for agricultural purposes. The index can be used as an aid in classifying land. It indicates the nature of the advantages and disadvantages of each region. It facilitates comparisons of different regions.

1396. TYDEMAN, H. M., AND PRESTON, A. P. 551.5(42)
Weather conditions during 1944.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, p. 43.

The chief points noted were: A series of ground frosts which occurred intermittently throughout the blossoming period of plums, apples and pears, and culminated in several frosts of exceptional severity shortly after the fruit-set of most fruit varieties, thus destroying the prospect of a promising crop. The very dry conditions which prevailed throughout the earlier part of the year had an adverse effect on the experimental nurseries and hop gardens at East Malling.

1397. SIL, J. M. 551.57.018
An intensity rain gauge.
J. Sci. Instrum., 1945, **22**: 92-4.

A description supported by diagram and photograph is given of a rain gauge which, it is claimed, has proved completely reliable over a period of several years. It needs no more attention for maintenance than an ordinary self-recording gauge. It does not need adjustment or calibration, though periodical cleaning is necessary. The rain is successively collected in one of three receivers over a period of 1 minute; floats in these receivers operate a common pen arm. Performance figures are quoted in comparison with those from an ordinary gauge. The instrument is sensitive to 0·02 in. of rain per hour.

1398. HEYNARD, F. 551.574
Note sur l'enregistrement pratique des rosées.
(Note on a practical method of recording dew.)
Ann. agron. Paris, 1943, **13**: 438-41.

The author discusses several apparatus for measuring dew, among them types made by the firm of Richard and by Professor Gamba of the Station Centrale de Bioclimatologie at Versailles. Work was in progress with these at the Station de Recherches Viticoles et d'Arboriculture Fruitière du Centre de Recherches Agronomiques du Sud-Ouest up to 1939 and was to be continued again in 1944.

1399. GODARD, M. 581.056
Le climat de la plante. **(Microclimatology.)**
Ann. agron. Paris, 1944, **14**: 200-14, bibl. 40.

In this survey of work on microclimatology the author discusses the subject under the following headings: the climate of the "biosphere" or immediate habitat of the plant, moisture, temperature, and solar radiation. He considers briefly the most likely methods by which plants can be made to grow in unaccustomed places, whether by acclimatization, or production of new strains the requirements of which correspond with local climatic possibilities.

Propagation and growth substances.

1400. STOUTEMYER, V. T., CLOSE, A. W., AND O'ROURKE, F. L. 631.535: 581.035
Rooting greenwood cuttings without sunlight under fluorescent lamps.
Science, 1945, **101**: 546.

Cuttings of *Weigela*, *Ligustrum* and *Chrysanthemum* rooted more rapidly in a dark room basement lighted with a 100-watt Mazda lamp than in the ordinary propagating frame. Particularly good results were obtained in small propagating cases of opaque material, each lighted with a 30-watt fluorescent lamp with cuttings of *Citrus*, *Cinchona*, *Hibiscus*, and other genera. Growth substance treatment sometimes influenced the photoperiodic behaviour of the cuttings. Thus *Citrus* normally responded similarly in 16-hour photoperiods and in continuous fluorescence, but after treatment with potassium indole butyrate there was a differential effect according to species, cuttings of the Chinotto orange rooting better in the 16-hour period, cuttings of the rough lemon favouring continuous exposure. The authors remark that high fuel costs in winter and excessive insolation in summer in glass structures have in the past been accepted unquestioningly. They point out that opaque structures can be built to maintain an equable temperature and humidity with only the low cost of illumination to be set against the higher costs involved in the management of glass houses. R.J.G. and E.S.J.H.

1401. HITCHCOCK, A. E., AND ZIMMERMAN, P. W. 577.15.04
Methods of rating the root-inducing activity of phenoxy acids and other growth substances.
Contr. Boyce Thompson Inst., 1945, **14**: 21-38, bibl. 6.

Eighteen of the phenoxy acids used in 1943 [see *H.A.*, 15: 424] on cuttings of privet were tested again, using a larger number of replicated treatments. The relative order was much the same as in the previous test and the relation between structure of acid and root-inducing activity was also essentially the same both years. Only two of the acids [2,4,5-trichlorophenoxyacetic acid and α-(2,4,5-trichlorophenoxy)-propionic acid] were equal in activity to α-naphthaleneacetic acid. The dichlorophenoxy and most of the monochlorophenoxy acids were of intermediate activity, while α-(2,5-dimethylphenoxy)-propionic and α-(2 chlorophenoxy)-propionic acids were of lowest activity. [From authors' summary.]

1402. BEAL, J. M., AND WHITING, A. G. 577.15.04: 581.14
Effect of indoleacetic acid in inhibiting stem abscission in *Mirabilis jalapa*.
Bot. Gaz., 1945, **106**: 420-31, bibl. 9, being *Contr. Hull bot. Lab.* **566**.

While untreated decapitated *Mirabilis jalapa* seedlings showed cessation of growth in the internodes followed by their abscission, the internodes of similarly decapitated plants, which were treated with a 2% indoleacetic acid-lanolin mixture on the cut surface, continued to grow and no

abscission took place. Fifteen longisections of decapitated plants are presented showing the histology of abscission and the effect of growth substance treatment.

1403. NEWCOMER, E. H. 577.15.04
Colchicine as a growth stimulator.
Science, 1945, **101**: 667-8, bibl. 2.
More than 20 species and hybrids of tree seedlings were treated with a 0·4% solution of colchicine emulsion plus wetting agent by pipetting one drop per day on each apical meristem. A large number of the plants treated with 4-7 applications of the solution responded by at least doubling their rate of apical growth.—University of North Carolina.

1404. HAMENCE, J. H. 631.86: 577.15.04
The occurrence of auxins in organic manures.
J. Soc. Chem. Ind. Lond., 1945, **64**: 147-8, bibl. 5.
An examination of the more common organic manures showed that they all contain growth substances, particularly β-indolylacetic acid, though in some cases in very small amounts. The figure for poultry manure (2 weeks old) is by far the highest recorded, the total auxin content expressed as indolylacetic acid amounting to 7·66 mg./100 g. on a dry basis.

1405. GRACE, N. H. 631.535: 577.15.04
Liberation of growth stimulating materials by rooting *Salix* cuttings.
Canad. J. Res., 1945, **23**, Sec. C, pp. 85-93, bibl. 10.
Physiologically active substances were liberated by rooting willow cuttings and retained by the solution or sand media in which rooting had occurred. Subsequent rooting of willow cuttings in such media affected the number and particularly the length of roots. Stimulation of root growth on dormant cuttings occurred, while the effects on non-dormant material were predominantly injurious. Stimulation or inhibition was related to the concentration of the liberated material. The active substance was thermostable and appeared to have effects similar to those of synthetic plant growth stimulants. It has been demonstrated that salicylates were not responsible for the activity. [Author's abstract.]

Noted.

1406.

a ALDRICH, D. G., PARKER, E. R., AND CHAPMAN, H. D. 631.67: 631.4: 631.8
Effects of several nitrogenous fertilizers and soil amendments on the physical and chemical properties of an irrigated soil.
Soil Sci., 1945, **59**: 299-312, bibl. 10, being *Pap. Calif. Citrus Exp. Stat.* **523.**

b CHINOY, J. J. 578.6
A simple micro-macerator for plant analysis.
Curr. Sci., 1945, **14**: 102-3, bibl. 3.

c HARDESTY, J. O., YEE, J. Y., AND LOVE, K. S. 631.84
Moisture relations of mixed fertilizers. Influence of nitrogenous materials.
Industr. Engng Chem. (*industrial edition*), 1945, **37**: 567-73, bibl. 5.

d MCCOOL, M. M. 631.841.5
Fertilizer value of sodium cyanide.
Contr. Boyce Thompson Inst., 1945, **13**: 479-85, bibl. 1.

e KUMM, J., AND FRENCH, C. S. 581.12
The evolution of oxygen from suspensions of chloroplasts; the activity of various species and the effects of previous illumination of the leaves.
Amer. J. Bot., 1945, **32**: 291-5, bibl. 16.

f VAN OVERBEEK, J., OLIVO, G. D., AND SANTIAGO DE VÁZQUEZ, E. M. 577.15.04
A rapid extraction method for free auxin and its application in geotropic reactions of bean seedlings and sugar-cane nodes.
Bot. Gaz., 1945, **106**: 440-51, bibl. 21.

g POTAPENKO, A. I. 581.035
On the adaptation value of the photoperiodic reaction.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 119-21, bibl. 2.

h SANDERS, H. G. 631.582
Rotations.
Bull. Minist. Agric. Lond. **85**, 1944, pp. 18, 4d.
Purely agricultural.

i SINGH, D., AND NIJHAWAN, S. D. 631.87: 631.432
A relative study of soil and artificial mulches in conserving soil moisture.
Ind. J. agric. Sci., 1944, **14**: 364-77, bibl. 15.

j SYNERHOLM, M. E., AND ZIMMERMAN, P. W. 635.64: 577.15.04
A note on the preparation of 2-chloro-3,5-diiodobenzoic acid and 2-chloro-3,5-dibromobenzoic acid and their effects on tomato plants.
Contr. Boyce Thompson Inst., 1945, **14**: 39-42, bibl. 3.

TREE FRUITS, DECIDUOUS

General.

1407. HATTON, R. G. 634.1/7
A survey of planting problems.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 96-8.
The layout of a typical plantation of 32 years ago is considered in the light of modern knowledge, and the chief points to be borne in mind in planning the plantation of to-day are emphasized. Helpful "signposts" point the way to a more considered planning of orchards and fruit industry, e.g. schemes for the certification of fruit plants true to name and free from disease, an agreed list of the principal commercial varieties recommended for working and planting on a large scale, and a census of fruit orchards enabling growers to get an approximate measure of the proportions of the chief kinds and varieties of fruit grown in Britain.

1408. KNEEN, T. H. 634.1/8(945)
Fruit industry statistics.
J. Dep. Agric. Vict., 1945, **43**: 314.
Victoria produces nearly one-third of Australia's fruit. Nearly two-thirds of Australia's dried vine fruit production, which now exceeds 90,000 tons, comes from this State and three-quarters of the canned fruit production, which in pre-war years exceeded 40,000,000 cans, is also of Victorian origin.

1409. MCCANN, H., AND OTHERS. 634.11(71)
Whither Canada's apple industry ?
Booklet **6**, reprinting articles from *Food in Canada*, 1945, pp. 19.

No. (1). MCCANN, H.
Whither Canada's apple industry ? pp. 2-6.
Tabulated data are presented on Canadian production and disposal of apples and on the disposition

of processed fruits during the period 1934-44. During the war, apple production was subsidized to stimulate both home consumption and dehydration. The prospects in the post-war period are regarded as good, provided the high level of home consumption can be maintained and certain conditions in the marketing sphere are fulfilled. The Okanagan Valley growers in British Columbia are chiefly interested in high-grade eating apples, while Nova Scotia will remain largely dependent on export to Britain. In Ontario, fresh sale promotion and the building up of processed markets seems indicated.

No. (2). EIDT, C. C.
Apple processing, pp. 6-10.
In Canada, the apple processing industry is concentrated in British Columbia and Nova Scotia. Both provinces send their fruit to distant markets and have no other possibility of disposing of their sub-grade fruit locally. The history of apple dehydration in Canada is recapitulated, and thin segments of a low moisture apple held at less than 10% moisture are described as the most attractive product, requiring a finishing temperature of 150°-155° F. Experimental work on the most satisfactory material for packaging is in progress at the Kentville Experimental Station. The discussion of the canning industry contains a description of a method of apple sauce manufacture developed by the Central Experimental Farm in co-operation with the American Can Company. There has been a tendency in Canada to overlook the importance of this product as an outlet for the apple industry. A large-sized master flow sheet covering all types of apple processing is attached.

No. (3). ATKINSON, F. E., AND STRACHAN, C. C.
Apple juice, syrup and concentrate, pp. 10-9, being *Contr. Div. Hort. exp. Farms Serv., Ottawa,* **641**.
The equipment used in apple juice production is described and illustrated by photographs and 2 diagrams of a sterilizer and of a mechanical agitator for clarifying apple juice during processing respectively. The former, with a capacity of over 500 gallons per hour, has been designed at the Summerland Experimental Station, B.C. A table indicates the amounts of constituents that may be expected in apple juice made from varieties grown in B.C. Nova Scotia apples tend to be markedly more acid, Ontario apples being intermediate. A second table lists varieties which have been used for juice, the hardness at desirable ripeness and the yield of juice obtained. One of the most popular blends is Newton and Jonathan in equal proportions, but Newton and Stayman have also been successfully blended. Apples should be used when they are considered prime for eating. Such operations involved in manufacturing clear apple juice, as grating and pressing, clarification, filtering, fortifying and sterilizing, filling, sealing and cooling the cans, are discussed. The manufacture of crushed apple juice and of concentrates and syrup is also briefly described. The authors believe an expansion of processing facilities in Canada would be justified and they visualize the complete mechanization of apple juice production.

1410. KELLERHALS, O. 634.1/7: 351.823.1
Alkoholgesetz und Förderung des Obstbaues. **(The promotion of fruit growing in Switzerland under the alcohol law.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 17-22.
The so-called alcohol law in Switzerland, which came into force in 1933, makes certain provisions for the support of fruit growing by the Government. The effect on the industry of organized support is discussed by the Director of the Alcohol Administration. During the first 10 years, the Government spent about 3,000,000 francs in equal parts on treating, removing and top-working fruit trees. Of 178,315 apple trees top-worked under the scheme from 1937 to 1943, 76% were worked to ten specified varieties, most of which are not grown in England. Legislation is demanded for compulsory certification of nurseries and for import control of rootstocks and young fruit trees.

1411. SCHAER, E. 634.1/8(494)
Der Obstbau der Gemeinde Weisslingen und seine Neugestaltung. **(Fruitgrowing in the Swiss village of Weisslingen and its reconstruction.)** [French summary ½ p.]
Landw. Jb. Schweiz., 1945, **59**: 176-202, bibl. 12.
Discussing the reorganization of fruitgrowing in Switzerland (*Schweiz. Z. Obst-u. Weinb.,* 1934, 43: 21, 58, 77) the late director of the Wädenswil Experiment Station, Dr. K. Meier, suggested that for all fruitgrowing villages or valleys in Switzerland plans for the future development of the industry should be worked out on the basis of the existing status and of the local production and market conditions obtaining. The study furnishes an example of how this programme could be carried out. Most of the paper is devoted to a survey of the fruitgrowing area around the village of Weisslingen (600 m. above sea level), presenting detailed information on climate and soil, number, kind, variety and age of trees, sales and trends since 1929. The section on reconstruction suggests a line of development borne out by the study of local conditions, gives a list of varieties most suited to the purpose and advises on steps to be taken to carry out the scheme.

1412. SCHMID, G. 634.1/7+634.8
Der gemischte Obst- und Weinbaubetrieb in der schweizerischen Landwirtschaft. **(Mixed fruit and vine growing in Swiss agriculture.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 26-9.
A combination of fruit and vine growing on the same farm is characteristic of the cantons of eastern Switzerland, while central and western Switzerland are more or less pure fruit growing and vine growing areas respectively. The advantages of the combination of the two industries under one management are set out.

1413. SCHWEIZER BAUERNSEKRETARIAT. 634.1/7(494)
Rentabilität in der schweizerischen Landwirtschaft im Erntejahr 1943/1944 (1. März 1943 bis 29 Februar 1944). I. Teil. **(Agricultural returns in Switzerland during the period March 1st 1943 to February 29th 1944. Part I.)**
Verbandsdruckerei A. G., Bern, from review *Schweiz. Z. Obst-u. Weinb.,* 1945, **54**: 285-6.
The review quotes, among others, the following figures in respect of the fruit crop in Switzerland: The average yield per bearing tree amounted to apples 98, 103·4 and 143·2 kg., pears 100·2, 126·4 and 137·2 kg. and cherries 27·8, 78·6 and 52·7 kg. in 1941, 1942 and 1943 respectively.

1414. KESSLER, H. 634.1/7(492)
Obstbauliche Reminiszenzen von der Insel Walcheren in Holland. **(Pomological recollections of the Isle of Walcheren, Holland.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 427-33.
An illustrated description of the fruitgrowing area of Walcheren before the Dutch island was flooded in the course of military operations in autumn 1944.

1415. ANON. 634.1/7(498)
100 Millionen Obstbäume in Rumänien. **(A hundred million fruit trees in Roumania.)**
Forschungsdienst, 1944, **17**: 338.
According to a report from Bucharest the number of fruit trees in Roumania (including Bessarabia) is estimated as

100 million. Fifty per cent. are in a bearing condition, 10% are not yet bearing and the rest are too old or neglected.

1416. ANON. 634.63
L'avenir de l'oléiculture. **(The future of olive growing.)**
Bull. Mat. grass., 1943, **28**: 141-2.
The future of olive growing was discussed at a conference of the International Olivegrowers Federation held at Florence in 1942. The chief threats to the industry appeared to lie in the greatly extended area devoted to oil seeds in Europe during the war and in the fact that there is as yet no satisfactory control of the olive fly. It was urged that further study of the life history of *Dacus oleae* was essential and that any control measures suggested should be tested under all the many environmental conditions in which control might be necessary.

Breeding and selection.

1417. (PALMER, E. F.) 634.1/8-1.523
Fruit breeding [at Vineland].
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 31-3.
The titles of the breeding projects at Vineland are enumerated. They concern the following fruits:—apples (3 projects), cherries (2), peaches (2), pears (2), plums (1), grapes (2), *Rubus* (4), and strawberries (6).

1418. HOBLYN, T. N. 634.1/2-1.546.4
The Bradbourne walled garden.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 115-7.
This is a description of the varieties of apples, pears, peaches and apricots to be planted in the Research Station's walled gardens at Bradbourne. A complete list of the varieties is arranged in a table to show the order of their approximate fruiting seasons.

1419. KOBEL, F. 634.11-1.523
Der Stand und die Aufgabe der Apfelsortenzüchtungen in der Schweiz. **(Present state and aim of apple breeding in Switzerland.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 6-10.
The efforts of apple breeders in Switzerland are chiefly directed towards producing varieties which combine good keeping qualities with other desirable characters. Systematic breeding attempts in this direction were started some 20 years ago by T. Zschokke, followed by K. Meier in the thirties and early forties and by two series of crosses carried out by the author. Only a few of Zschokke's several hundred seedlings have been retained, among which No. 30, a cross of Ontario × Géante d'Exposition, shows promise. The fruit is intermediate in appearance between Ontario and Danziger Kantapfel and is of good quality; it keeps until the late spring. Growth habits and yield of the tree are being studied. Dr. K. Meier thought it necessary to observe each of his many thousand seedlings on its own roots, but he tried to obtain early cropping by growing them in cordons and tying the branches down. The chief drawback of this method is that for some years the seedlings will go on forming juvenile wood, which does not produce fruit buds. The more vigorous types, moreover, tend to produce long water shoots and to delay the formation of fruit buds even longer. Part of the material has already been proved unsuitable. Professor F. Kobel. In his first series of crosses the author tried to achieve early fruit set by working his material on E.M. IX, using the wood of 1- or 2-year-old seedlings. However, also on E.M. IX, the seedlings continued to form juvenile wood for several years, the crown remaining sterile in its interior and the fruits appearing at a considerable distance from the trunk. In a second series these undesirable features were avoided by growing the seedlings in close stands in the nursery until the shoots showed normal wood characters. They were then worked on E.M. IX. This method will produce fruits after about 8 years and allows many seedlings to be studied on a small area. A rapid method of evaluating the quality of new apples by a card system is described in some detail, and the segregation of 6 fruit characters in 4 crosses (Berner Rosen × Jonathan; Champagner × Berner Rosen; Champagner × Metzersur; Champagner × Goldparmäne) is shown. The continuation of consistent breeding and the examination of the new products will, it is confidently hoped, provide the Swiss fruit grower with valuable keeping apple varieties before very long.

1420. (PALMER, E. F., AND KERR, E. A.) 634.25-1.523
Peach breeding.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 46-8.
A note is given of the comparative value of some peach varieties as parents and grandparents. Eighteen varieties have more than 100 progeny. The experimental data indicate that Early Elberta, Fisher, Halehaven, J. H. Hale, Valiant, Vaughan and Vedette are the best of the varieties tried.

1421. (PALMER, E. F.) 634.1/7-1.521
Distribution of [Vineland] Station varieties of fruit and Notes on Station introductions.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 38-45.
It may be noted that all introductions which have completely originated with the Station begin with V, e.g. Velvet sweet cherry, Viking red raspberry, Valentine strawberry, Vaughan peach, etc. Notes on the characters of these and others are given here.

1422. ENGSTEDT, G. 663.813: 634.11
Äpple som råvara vid tillverkning av must. **(Apples for juice production.)**
Fruktodlaren, 1943, No. 4, pp. 121-3.
Fruit maturity, the condition of windfalls, transport and storage in relation to apple juice production are discussed, and the significance of selecting suitable varieties is emphasized. Eighteen such varieties are listed, all of them belonging to the late-maturing class. Apples ripening in autumn come second, whereas early varieties will give a product which lacks sweetness and fragrance.

1423. BOWMAN, F. T. 634.11-1.521
Some varietal aspects of Australian apple production.
J. Aust. Inst. agric. Sci., 1945, **11**: 16-23, bibl. 6.
The main defects in Commonwealth apple production and export and interstate trade seem to have their origin in an excessive production of mid-season and insufficient production of early and late varieties. These defects appear to be aggravated, generally speaking, by a distribution of these groups of varieties amongst the States which is in apparent contrast with the climatic advantages of the States. This position suggests the advisability of encouraging a re-distribution of varieties, having as its general aim an increase in early varieties in early States, and of late varieties in late States. This could be carried out in conjunction with the policy of a reduction of varieties, applying to the reworking of bearing trees of unwanted varieties and the planting of new areas. The present production survey suggests the possible value of periodical surveys of the apple industry in which due prominence is given generally to the varietal aspect and particularly to prospective varietal production, the information for which should be obtained from periodical censuses. [Author's conclusions.]

1424. VERNER, L. 634.11-1.521
The Idared apple.
Circ. Idaho agric. Exp. Stat. **84**, 1942, pp. 3.
A technical description is given of a new apple variety, the

first to be introduced out of a selection of about 100 promising seedlings under trial at the Experiment Stations at Moscow and Parma, Idaho. Idared is a cross between Wagener and Jonathan, larger than either parent, and in the cooler districts superior in dessert quality. Bright red colour, very small core, creamy white, smooth-textured flesh and superior keeping qualities are among the other outstanding features reported of the new variety.

1425. LOREE, R. E. 634.22
Plums in Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 196-9.
A brief survey of the plum industry, with variety recommendations for future planting in Michigan, accompanied by 2 colour plates picturing 7 varieties.

1426. BURKHOLDER, C. L. 634.22-1.521
Plum variety trials at the Purdue Farm, Bedford, Indiana.
Bull. Ind. agric. Exp. Stat. **458**, 1941, pp. 20.
The results are reported of plum variety trials started in 1928 with 16 varieties in order to study the practicability of commercial plum production in southern Indiana. A large number of additional varieties have been included in later years. The winter hardiness of plums was found to be much superior to that of peaches, the plum buds having been injured only once, while peach buds were destroyed 5 out of 9 years. Five varieties are named which are able to withstand low spring temperatures. The varieties discussed in detail in the order of ripening are almost exclusively of the European type.

1427. SIMMONDS, A. 634.22-1.521
The origin of the name "Green Gage".
J. roy. hort. Soc., 1945, **70**: 240-1.
The commonly accepted story that the Reine Claude plum was introduced into England from France by Sir Thomas Gage and named after him is refuted. Apparently, this variety was introduced by an ancestor of Sir Thomas's, Sir William Gage, of Hengrave Hall, near Bury St. Edmunds, in 1724. Sir William was probably not the only, or even the first, person who had imported the "Green Gage" plum although it was after him that it was named.

1428. PALMGÅRD, E. 634.23
Bättre körsbärsskördar genom lokalsorter. **(Local varieties for better cherry crops.)**
Fruktodlaren, 1943, No. 3, pp. 79-80.
To restore the situation in certain cherry-producing areas in Sweden following severe frost damage, the systematic propagation of selected local seedling cherry trees is advocated. Owners of such trees sending in their fruit may receive prizes from a committee on condition of selling material for propagation.

1429. KESSLER, H. 634.11(494)
Ein neues Obstbilderwerk in Bearbeitung "Die Apfelsorten der Schweiz". **(An illustrated pomology in preparation: Swiss apple varieties.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 210-3.
This preliminary announcement of an illustrated pocket edition of the Swiss apple varieties shortly to be published by the Swiss Pomological Society, includes the sample of a variety description (Carpentin Reinette).

1430. SCHAER, E. 634.1/7-1.521
Kurze Übersicht über die Systematik in der Obstsortenkunde. **(A survey of pomological and taxonomic systems for fruit varieties.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 320-4.
A brief historical survey. A. F. A. Diel, 1756-1839, a doctor in a German spa, was the first to undertake a systematic description of pome fruit varieties.

Propagation and rootstocks.

1431. GARNER, R. J., AND HATCHER, E. S. J. 634.22-1.541.11: 577.15.04
A note on the use of synthetic growth substances on plum rootstock layer beds.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 34-6, bibl. 9.
Experiments are described in which synthetic growth substances were applied to established plum rootstock layer beds in the form of sprays and dusts. In one experiment the crop of root shoots was increased by spraying, but in two others of similar size, and in one large-scale experiment, negative results were obtained. It is concluded that such spraying treatments, in the absence of wounding, are unlikely to have any practical value. [Authors' summary.]

1432. TUKEY, H. B., AND CARLSON, R. F. 634.25-1.531.17
Morphological changes in peach seedlings following after-ripening treatments of the seeds.
Bot. Gaz., 1945, **106**: 431-40, bibl. 6, being *J. Art. N. York St. agric. Exp. Stat.* **627**.
The effect of different periods of after-ripening on the morphological development of peach seedlings was studied by treating more than 10,000 seeds of 19 varieties from 12 sources at 34°-36° F. for periods of 3-12 weeks, followed by germination at 68° F. A table shows the distribution of normal and dwarfed seedlings of 10 varieties from after-ripened seeds, thus indicating the after-ripening requirement of each variety for the production of normal plants. The proportion of anomalous plants was found to increase progressively as the after-ripening period lengthened. Data presented in a second table indicate that the frequency of anomalous plants is higher from excised than from non-excised seeds. The relation of abnormal seedling development to photoperiod and nutrition is also briefly discussed.

1433. AROEIRA, J. S. 634.1/7-1.541
A enxertia na propagação de plantas frutíferas. **(Grafting and budding in the propagation of fruit trees.)**
Ceres, 1944, **6**: 22-43.
Methods are described of raising and of budding and grafting rootstocks of fruit trees grown in temperate and sub-tropical regions. There are notes in the text on the technique employed in special cases, and the information is summarized in a table, for ready reference, for citrus, avocado, annonas, plums, persimmon, grape-vine, peach, apple, pear and chestnut, under the headings: name of fruit, rootstock mostly used, types of soil (for particular rootstocks), source of rootstock (seeds or cuttings), period of the year when the seeds or cuttings are taken, methods of grafting or budding.

1434. EAMES, A. J., AND COX, L. G. 631.541
A remarkable tree-fall and an unusual type of graft-union.
Amer. J. Bot., 1945, **32**: 331-5, bibl. 6.
The tree fall investigated, a clear transverse break at ground level, occurred in an approximately 40-year-old white fir (*Abies concolor*) and was due to incompatibility of stock and scion, probably aggravated by a poorly executed graft. The interesting anatomy of the tree resulting from the failure of the two cambium cylinders to unite is described and illustrated.—Cornell University, Ithaca, N.Y.

1435. DAS, C. M., AND DAS, N. K. 631.875
An improved method of preparing leaf compost.
Ind. Fmg, 1945, **6**: 219-20.
A method of compost preparation from dry oak leaves and pine needles has been developed to suit the requirements of cultivators and orchardists in the Kumaon Hills. The special feature of the system is the aerobic decomposition of the material made possible by the construction of a pit

which allows for ventilation and drainage through a hole leading from outside to the pit bottom. The procedure of composting is described separately for the hills and the plains.

1436. UPSHALL, W. H. 634.1/2-1.536
The use of moist peat in transplanting fruit trees.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 27.

The sprinkling of about 12 quarts of peat moss around and above the tree roots when transplanting has been recommended. Tests at Vineland with apple, pear, plum, cherry and peach indicate that under their conditions the expense is not justified by results.

1437. UPSHALL, W. H. 634.1/2-1.536
The effect of exposure to drying conditions on stand and growth of nursery fruit trees.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 26-27.

Work at Vineland indicates that given dormant conditions the short exposure incidental to transplanting of the roots of apple, pear, plum, cherry and peach will do little or no harm. In tests made on these species [exact numbers not stated] a 3-year average shows the stands to have been as follows:—No exposure, 100% stand; 2 days exposure, 88% to 100% stand; and 7 days exposure, 37% to 92% stand. The stand of peach trees after 7 days exposure was negligible.

1438. SCHMID, G. 634.1/7-1.536: 351.823.1
Die Baumschulenkontrolle 1934-1944. **(Fruit tree nursery certification in Switzerland, 1934-44.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 207-10, 214.

A report on the working of the voluntary scheme of nursery certification in Switzerland, aiming at the standardization of fruit varieties in commercial fruit growing, during the first 10 years since its initiation. The account includes a list of 11 recommended apple varieties and supplementary lists for apple, pear, plum and cherry varieties.

1439. SWARBRICK, T. 634.22-1.535: 577.15.04
The use of indole-butyric acid and α-naphthaleneacetic acid to facilitate the rooting of yellow pershore plum stocks.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 48-9.

Good results were achieved by dipping Yellow Egg Pershore suckers in a clay puddle impregnated with 20 p.p.m. solution of indolebutyric acetic acid or α-naphthaleneacetic acid. Not only were larger stands of living stocks obtained in both cases than from the controls, but there was also a marked improvement in the growth of leader shoots in the stocks treated with indolebutyric acid.

1440. GLEISBERG, W. 634.1/2-1.541.11-1.535.6
Die Wurzelstecklingsvermehrung der Obstgehölze. Ein Mittel zur Behebung der Unterlagenverknappung. **(The propagation of fruit trees by root cuttings as a means of overcoming the shortage of rootstocks.)**
Forschungsdienst, 1944, **17**: 304-17, bibl. 3.

The investigation was started originally with the aim of providing cold resistant rootstocks and stem builders for pome and stone fruit in eastern Germany. However, as the detailed discussion on its possibilities shows, the method of propagation by root cuttings has since been adapted for more ambitious purposes. The actual production of a clone of plants developed from root cuttings from a desirable source merely involves the severance of one root from the mother tree, which will continue to grow undisturbed. Cold resistant rootstocks used for the purpose are of two sources: (1) European or foreign seedlings and hybrids of selected wildings; (2) wildings growing in frost areas but showing no signs of frost damage. The method of propagation from root cuttings is no less important for the production of stem builders. The working of selected types of stem builders, both pome and stone fruit, on root cuttings (method not specified) will shorten the period of training and is described as a great technical improvement in nursery practice. The problem of propagating stem builders on their own roots, the aim in view, seems also on the way to solution. A further important field of application is the testing of new varieties, either as clones on their own roots quickly obtained from root cuttings, or under special local conditions on rootstocks propagated by root cuttings from trees particularly adapted to the locality. The experimental results reported relate to the points raised in the general discussion. (1) *Shoot formation in root cuttings of pome and stone fruit rootstocks*: The plants were raised from root cuttings in frames by a method not specified, the percentage of shoots developing from the cuttings being tabulated. *Malus silvestris* yielded the lowest percentage, 12·2%, of all *Malus* species tested, while *M. sieboldii arborescens* yielded 66·16%, EM-type rootstocks averaging 46·80%. Results with pears ranged from 14·4% (*Pyrus ovoidea*) to 82·54% (*P. salicifolia*). With plums, a number of *domestica*, *cerasifera* and *insititia* types were compared with 9 other plum types propagated in a different manner. Among the first-mentioned types the following yielded above 50%: Kroosjes Blau (55%), St. Julien E.M. "A" (75·3%), Broadl. Mussel (84·6%), Damas clone E.M. "C" (90·5%), Common Mussel (95%). Two further tables show that the vigour of the mother tree determines the number of root cuttings obtainable, hence classification of seedlings according to vigour is also necessary for propagation by root cuttings. (2) *Root cuttings for the raising of stem builders on their own roots*: After the extreme winters of 1939/40 and 1940/41 cold resistant varieties and wilding seedlings were selected for propagation as stem builders. The results of this line of investigation will be published elsewhere. Experiences in eastern Germany have shown that in combinations with somewhat cold susceptible varieties the frost resistant stem builder must provide not only the stem, but also the frame. (3) *The application of the root cutting propagation method in breeding*: A table indicates the number of shoots formed by root cuttings from new crosses of Mitchurin and other Russian varieties. The seed was sown in the spring of 1941. Root cuttings were taken from the 2-year-old seedlings in the autumn of 1942 and the resulting plants, again multiplied by root cuttings, were transplanted in the autumn of 1943. The shoot formation of root cuttings from free-pollinated seedlings varied from 56·2% (Kandilkitaika) to 93·7% (Szafrankitaika), averaging above 60% for 12 out of 15 sources. The average plant yield per seedling varied from 3·7 (Slawianka, 2) to 9 (Borowinka), with an average over 5 for 12 out of 15 sources. Out of 245 seedlings only 13 failed to develop plants from root cuttings. Thirty-four out of 245 seedlings yielded at least 10 plants. Three tables present data on the size classes of the newly formed plants and on the relation between the vigour of the mother seedling and the size class of the plants developed from its root cuttings. It is reported that on the strength of the encouraging results obtained in these experiments nurseries have started to use this method of propagation for the commercial multiplication of rootstocks. The study was carried out in occupied Poland and eastern Germany. Photographs illustrate the results.

1441. VAN OVERBEEK, J., AND GREGORY, L. E. 631.535.4
A physiological separation of two factors necessary for the formation of roots on cuttings.*
Amer. J. Bot., **32**: 336-41, bibl. 22.

Ruth Wilcox is a difficult-to-root white-flowered form of hibiscus. It does not respond to regular auxin treatments. However, if a shoot of an easy-rooting red hibiscus is grafted on cuttings of the white form an abundance of roots is

* See also *H.A.*, 15: 1235.

formed provided the base of the white cuttings is treated with auxin. Without additional auxin treatment the grafted hibiscus shoot is incapable of producing roots. These experiments show that for root formation on the cuttings of the white form two factors are necessary: (1) auxin, and (2) a factor (or complex) present in the leaves of red hibiscus. The downward transport of the second substance takes place through the bark and is not strictly rectilinear. Only further research will tell whether the root-forming effect of red hibiscus leaves is hormonal or nutritional or both. [Authors' summary.]—Institute of Tropical Agriculture, Mayagüez, Puerto Rico.

1442. GARNER, R. J. 634.1/2-1.541.11
A guide to the use of fruit tree rootstocks.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 98-104.

This is an article for incorporation in a forthcoming bulletin of the Ministry of Agriculture, on fruit tree raising. The chief characteristics of the rootstock varieties for apples, pears, cherries, plums and allied stone fruit are described to enable tree raisers and fruitgrowers to make a selection of rootstocks suitable for their particular needs.

1443. HOBBIS, E. W., AND CATLOW, E. 634.13-1.541.11
The performance of certain varieties of pear on various rootstocks at Long Ashton. Progress report 1.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 21-30.

This report deals with the performance of a number of pear varieties planted at Long Ashton in 1934/35 at 15 × 12 feet on 3 layered seedling pear stocks, namely B 1 and D 3 from East Malling and one other and quince A, B, C, and G stocks. Soft fruits have been grown under the trees and are being removed this year, 1945. Conference was the variety most used, but there were also nine others in the trial. After 10 years the biggest trees are those of Beurre Hardy, whether on quince or seedling stock. The smallest are Fertility, Dr. Jules Guyot and Williams. Twenty-nine out of thirty trees worked on quince G were lost, whereas losses of the same varieties on A, B and C were comparatively few. The heaviest crops have been produced by Beurre Bedford and Bristol Cross on quince and Williams on B 1 and D 3. Conference has made good trees on all stocks except quince G and its yield has been highest so far from trees on quince C. It seems possible that the total weight of crop produced by trees on quince, which so far has exceeded that on pear, may be exceeded by that of the larger trees on pear within the next few years. Doyenne du Comice has proved the most shy yielder. Williams' behaviour on B 1 and D 3 pear stocks augurs well for the future, since on quince double working is necessary for this variety.

1444. BEAKBANE, A. B., AND THOMPSON, E. C. 634.1/2-1.541.11
Accelerating rootstock research.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 106-8 being reprinted from *Monthly Science News*, No. 6, 1945.

There is a close correlation between the anatomical structure of apple rootstock roots and the vigour of the varieties worked on them. In general, rootstocks with a high proportion of living cells in the roots will induce dwarfing and youthful cropping. Such observations offer a means of hastening the testing of new rootstock varieties.

1445. UPSHALL, W. H. 634.23-1.541.11
Rootstocks for sweet cherries.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 11-4.

Since 1933 sweet cherries on Mahaleb and Mazzard have been distributed by the Station for trial purposes in the Niagara Peninsula and kept under observation. Results to date show the greater tolerance of the Mazzard rootstock to poor drainage. Trees on Mahaleb up to the age of 9 to 11 years have under good soil conditions neither come into bearing earlier nor been more dwarfed than those on Mazzard.

1446. HILKENBÄUMER, F. 634.1/2-1.541.11
Verhalten von Kernobst-und Steinobstunterlagen während des Jugendstadiums an verschiedenen Standorten. **(The behaviour of rootstocks for pome and stone fruit in their early stages at different localities.)**
Bechtold & Co., Wiesbaden, 1943, pp. 55, from review *Schweiz. Z. Obst-u. Weinb.*, 1945, **54**: 127.

The book is apparently a summary of the author's results obtained in long-term experiments and published in detail in 1942 (*H.A.*, 14: 496).

1447. ANON. 634.1/2-1.541.11
Fruit tree planting after six years of war.
Fruitgrower, 1945, **100**: 183-6.

A survey of the position in some leading English nurseries in the autumn of 1945 in respect of the supply of fruit trees and soft fruit nursery stock.

Pollination.

1448. FRITZSCHE, R., AND KOBEL, F. 634.22: 581.162.3
Befruchtungsversuche mit der Fellenbergzwetschge. **(Pollination experiments with the Italian Prune.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 44-6.

The experimental data presented indicate that the Fellenbergzwetschge (Italian Prune) is not partly self-sterile, as maintained by earlier authors, but is completely self-fertile. The erroneous results were probably obtained by using a too small number of flowers for the trials. It is suggested that on re-examination also other varieties, described as partly self-sterile, may turn out to be self-fertile.—Swiss Horticultural Research Station, Wädenswil.

1449. RIERA, F. J. 634.63: 581.46
Pleomorfismo y esterilidad ovárica del olivo. **(Pleomorphism and sterility of the ovary in the olive.)**
Anal. Esc. Agric. Barcelona, 1941, **1**: 75-96.

Floral sterility in the olive is a varietal characteristic or at least a tendency relatively constant and the floral formulae denote characters of taxonomic value for the classification of varieties. The olive can be considered as a pleomorphic species of an irreversible type, within certain limits for each variety. The rudimentary stages of the ovary, style and stigma in the staminate flowers are typical cases of morphological and physiological sterility. The environment appears to have a morphogenic action on these stages.

Growth.

1450. BLAKE, M. A., EDGERTON, L. J., AND DAVIDSON, O. W. 634.11: 581.14
Standards for judging the growth status of apples in New Jersey.
Bull. N.J. agric. Exp. Stat. **715**, 1945, pp. 36, bibl. 3.

Spur leaves, dormant fruit buds and 1- and 2-year-old growth are the 3 tree characters on which the authors base their standards for judging the growth status of bearing-age apple trees. (1) *Spur leaves.* This character has been worked out for 6 varieties, and the spur leaves of 4 Delicious classes, some in an over-vegetative status, are reproduced. The measures given for Delicious spur leaves are: Class 1—1 or 2 leaves 4 in. long or at least 3 leaves 3·5 in.; extravigorous class 1—4 or 5 leaves at least 3·5 in. long. Class 2—1 or 2 leaves at least 3·5 in., or no leaves 3·5 in. but 4 or 5 leaves 3 in. Class 3—Some leaves at least 3 in. Class 4—No leaves 3 in. When the larger spur leaves have

a width of more than 50% of their length associated with certain other characters, the tree is likely to be over-vegetative. (2) *Dormant spur buds.* Data are presented for 11 varieties, the measures of diameters for Delicious being: Class No. 1: 0·22 in. and larger; No. 2: 0·19-0·21 in.; No. 3: 0·16-0·18 in.; No. 4: less than 0·16 in. No. 1 and No. 2 buds of the Delicious variety may be expected to be fruitful under favourable conditions, while No. 3 buds are uncertain and No. 4 buds of no economic importance. (3) *One- and two-year-old growth.* The outstanding result of a detailed study of the Delicious, Stayman and McIntosh varieties is that thick annual growths are associated with larger numbers and larger sizes of fruit buds on the 2-year-old wood than thin annual growths of corresponding lengths. The following data, which refer to Delicious, are taken from a table indicating New Jersey standards for rating the growth status of the above-named 3 apple varieties during the dormant season. (*a*) Thick (I) Length of annual growth: 3-4·9 in., 7-8·9 in., 11-12·9 in.; (II) base diameter of 1-year growth: ·16+ in., ·19+ in., ·24+ in. respectively; (III) base diameter of 2-year growth: ·27 in., ·30 in., ·41 in. respectively; (IV) number of class 1 and 2—buds: 3-4, 4-5, 5-6 respectively. (*b*) Medium (I) 3-4·9 in., 7-8·9 in., 11-12·9 in.; (II) ·14-·16 in., ·17-·19 in., ·20-·24 in.; (III) ·23 in., ·27 in., ·30 in.; (IV) 1-2, 1-2, 1-2. (*c*) Thin (I) 3-4·9 in., 7-8·9 in., 11-12·9 in.; (II) ·13 in. or less, ·16 in. or less, ·19 in. or less; (III) ·15 in., ·24 in., ·25 in.; (IV) no 1- and 2-class buds. Additional characters found to be of value in the estimation of tree growth include number and size of flowers in proportion to leaves, bark colour on 1- and 2-year-old wood growth and size and finish of the fruits at various times during the season.

Cultural practice.

1451. HOBBIS, E. W. 634.11-1.542
Intensive systems of apple production with particular reference to dwarf pyramids.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 15-21, bibl. 5.

An account is given of a plantation of apples grown as dwarf pyramids on an easy working light loam soil overlying greensand in Wiltshire. The trees, Cox's Orange, Ellison's Orange, Worcester Pearmain, Laxton's Superb on Malling II stock with Early Victoria—for pollination—on Crab, were planted 6×3 ft. apart, in 1934/35 and 1935/36, so that, taking roadways into account, there were 2,300 trees to the acre. Worcester reacted badly and no records were kept of this variety. The plantings finally included Cox 9,000, Ellison's 1,050 and Superb 2,300 trees. *Pruning.* Trees were planted as maidens, which were cut back to 2 ft. 6 in. The aim thereafter was to grow a tree with a central stem from which radiated well-placed, wide-angled, lateral branches, which in time were furnished with spur systems and used for the annual production of new wood. In the 11th year few of the trees are over 6 ft. high, but laterally they have filled out to form solid hedges. It has been difficult to prevent overcrowding. *Cultivations.* In early years clean arable cultivation was maintained, but later management has consisted in leaving down for one or more seasons and breaking up as growth requirements have demanded, e.g. after a season of insufficient growth. *Manuring.* Two to three cwt. of sulphate of potash per acre were given from 1934 to 1940. Since then flax-ash (shivings) has been relied on mainly as a source of potash. Nitrogen, generally supplied as nitro-chalk, accompanied the letting down of the orchard to grass and weed. The application of nitrogen together with clean weeding or grassing down has been used as required. Where the necessity for breaking up of grass was indicated by marked diminution in new wood and over-production of blossom buds, the breaking up was undertaken and followed by the application of up to 5 cwt. nitro-chalk. Phosphates were given as 3-4 cwt. superphosphate every few years. *Pest and disease control.* The basic spray programme was winter washing followed by 2 pre-blossom and 2 post-blossom lime-sulphur applications. This was in some cases followed by 4 to 5 applications of dust. *Pollination.* Twenty stocks of bees were kept in the plantation. *Crop records.* Ellison's cropped heaviest, averaging 6 lb. per tree over a period of 8 years from the second year after planting. Cox's cropped consistently, but Laxton's was erratic. In the plantation, now probably at its peak of production, overcrowding is evident. Early yields and good returns have been achieved. But it must be noted that these trees were on known rootstocks and any similar planting on seedling stocks would, in the author's opinion, probably lead to disaster. At present prices the cost of trees would be extremely high. Very skilful management is necessary, and for a beginner to undertake such a layout would be extremely hazardous.

1452. HILKENBÄUMER, F. 634.1/7
Obstbau. Grundlagen, Anbau und Betrieb. **(Fruit growing.)**
Parey, Berlin, 1944, pp. 356, RM. 14.60, from review *Schweiz. Z. Obst-u. Weinb.*, 1944, **53**: 439-40.

The author is the head of the Schraderhof Fruit Research Station of Halle University and is therefore in a position to utilize the results of the large-scale experiments, which have been carried out there for many years. The reviewer gives special praise to the chapter on rootstocks and to the treatment of root growth. The book, the make-up of which is reported to be excellent, contains 168 illustrations. It is divided into 3 parts, namely the physiological basis of fruit growing, fruit growing, and orchard management.

1453. TRENKLE, R., AND OTHERS. 634.1/7
Obstbau-Lehrbuch. **(A textbook of fruit growing.)**
R. Bechtold & Co., Wiesbaden, 1944, pp. 488, 5th revised edition, RM. 9.—, from review *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 27.

The 5th revised edition of this popular work is published in a single volume. It is said to incorporate the progress made during the 8 years since its last publication and contains 309 illustrations.

1454. SCHMID, H. 634.1/7
Der Gartenobstbau in Wort und Bild. **(Fruit growing in private gardens.)**
Verbandsdruckerei A. G., Bern, undated, pp. 80, Fr. 3.80, from review *Schweiz. Z. Obst-u. Weinb.*, 1944, **53**: 311-2.

The Oeschberg method of training and pruning fruit trees has been adapted to the treatment of dwarf trees. Eighty-six photographic illustrations are a valuable supplement of the text.

1455. (KELLY, C. B.) 634.1/2-1.536
Fruit tree planting distances.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 59-60.

In an attempt to solve the problem of spacing fruit trees a questionnaire was sent out to 1,518 growers, and from the 350 replies received a table has been drawn up and is here reproduced in which the spacing for bearing orchards, young orchards and future plantings is given. There is a definite trend towards wider spacing. Thus 19·7% of bearing peach trees are 18 feet apart. But whereas only 12·7% of young peach orchards are under 18 feet, only 5·4% of future orchards will be set so close. In the 22 and over feet apart the percentages are bearing orchards 1·6, young orchards 2·2 and for future planting 18·2. The trend is similar for apples and other fruits.

1456. WICKHAM, R. D. 634.1/2
Temporary intercrops for orchards.
Fruitgrower, 1945, **45**: 179-80.

The paper read at the Maidstone Conference on Fruit-Planting in November 1944 includes the following recommendations: (1) Young cherry orchards can be suitably

intercropped with loganberries (8 ft. by 5 ft.) grown on poles or raspberries planted at 8 ft. and 3 ft. in the row on strong soil. The grubbing of soft fruit should start after about 10 years. (2) The most suitable soft fruit for Cox's and most dessert apples is the strawberry, though ideal dessert apple soil will be rather too dry for strawberries, while a soil better for strawberries may tend to produce canker in apples. (3) For frosty areas, which are less suitable for other soft fruit, blackberries may do well planted 12 ft. by 8 ft. and grown on single 4 ft. 6 in. wire. (4) In the case of a severe frost maximum production of vegetables is necessary to use up the manure applied in anticipation of a large fruit crop. (5) Intercropping with vegetables is satisfactory only in young orchards. Crops and rotations are suggested for light and medium soils.

1457. SHAW, J. K. 634.11
Establishing apple orchards.
Leafl. Mass. St. Coll. Ext. Serv. **182** (revised), 1943, pp. 8.
The discussion of the problems involved in establishing an apple orchard in Massachusetts includes the following points: (1) In order to allow room for the sprayer, etc., the larger growing varieties on fertile soils should be planted at a wider distance than the 40 × 40 feet commonly used, and the spacing should be 5 feet more in one direction than the other. The following distances are suggested: 45-50 ft., Baldwin, McIntosh and others; 40-45 ft., Northern Spy, Macoun and others; 35-40 ft., Cortland, Delicious and others; 30-35 ft., Wealthy, Williams and others; 25-30 ft., Oldenburg, Yellow Transparent. (2) One solid row of the pollenizing variety is recommended for each 4 rows of the main variety. A list of pollenizers is given. (3) The practice of using peaches as fillers is not encouraged. The best plan may be to interplant with annual crops, allowing plenty of space for the trees to avoid the injurious effect of shade on the young trees. Apple varieties that may be used as fillers are listed. The use of semi-dwarfing rootstocks for fillers is mentioned as a probable future development. (4) Young orchards should generally be cultivated, at least around the trees as far as the roots extend.

1458. VERNER, L., AND WOODBURY, G. W. 634.11
Crops and cultural practices on former apple orchard land.
Bull. Idaho agric. Exp. Stat. **250,** 1943, pp. 18, bibl. 8.
The reclamation of cleared apple orchard soils, which are in poor physical condition and of low fertility owing to the accumulation of toxic spray materials, was studied for 6 years, and the following method of rehabilitation is recommended: (1) Give a liberal application of farmyard manure. (2) Grow winter rye or Sudan grass, to be ploughed under in spring and late summer respectively, for 1 or more years. It will usually take 2-4 years until cover crop growth is no longer seriously depressed. When this stage is reached the soil has been built up again and may be planted to most tree fruits and small fruits and several vegetable crops. Legume crops are the most susceptible to arsenic residues, and it will usually take at least 5 years after tree removal before they can be successfully grown.

1459. GRUBB, N. H. 634.23
Planning a cherry orchard.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 104-6.
In planning a sweet cherry orchard the following points should be considered:—The varieties selected must ensure efficient cross pollination; they should be such that their blossoming periods overlap and that there is a good succession in time of ripening. Resistance or susceptibility to disease, particularly bacterial canker, and the shape and ultimate size of the trees must be borne in mind.

1460. SHAW, J. K. 634.11-1.542
How to prune bearing apple trees.
Leafl. Mass. St. Coll. Ext. Serv. **10** (revised), 1944, pp. 8.
Light or only moderate pruning of well cared-for trees is advocated, apart from removal of dead, diseased and broken branches, of weak wood and of water sprouts. Summer pruning is recommended only for dwarf trees trained to special forms and top-grafted trees. The aim of pruning is defined as " to favor or at least not discourage the development of vigorous, stocky young spurs as the tree develops ".

1461. UPSHALL, W. H., AND BRADT, O. A. 634.25-1.542
Pruning methods for bearing peach trees.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 18-25.
This is the second and final report on a peach pruning trial started at Vineland in 1937 and reported in *Scientific Agriculture,* 23: 257-64; *H.A.,* 13: 756. A similar but more extensive trial was started in a one-year orchard in 1941 and from the two experiments it is hoped to get an answer to the following question:—Is there sufficient increase in grade of fruit and vigour of growth and decrease in thinning and picking costs to compensate for the reduction in total crop which pruning involves and where is the point of balance? The following conclusions are drawn from the first experiment:—For bearing peach trees in their prime, fifth to eleventh or twelfth years, which were making satisfactory growth, heading into two-year wood or thinning of healthy laterals definitely reduced both crop and monetary returns. Under the conditions of this experiment growth was sufficiently maintained and yields and returns were increased by minimum pruning methods involving removals of (1) dead, dying and very weak wood, (2) low drooping branches, (3) branches having bad crotches, and (4) branches in a vertical position which increase picking costs.

1462. REBOUR, H. 634.63-1.542
Aide-mémoire du tailleur d'oliviers. **(The olive pruner's handbook.)**
Bull. Inspect. gén. Agric. algér. **97,** 1944, pp. 21.
For a brief abstract of the 1941 edition of this bulletin, see *H.A.,* 14: 1529.

1463. BRYNER, W. 634.1/2-1.542
Zum Formieren der Hochstamm-und Pyramidenkrone. **(The formation of crowns in standard and pyramid fruit trees.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 55-8.
The crown of a standard fruit tree or a pyramid should be formed by 4 limbs, which are regularly spaced around the leader, with angles not exceeding 45°. Having the angles of the limbs too steep favours the development of incurable canker in the case of frost injury and may lead to the death of the limb or even of the tree. This is especially true for pears or quinces grown on wet or heavy soils. It is further recommended that the limbs should not issue at approximately the same level but be spaced up to 50 cm. along the trunk, although this may prolong the training of the tree by 2-3 years. At Wädenswil, the so-called formation cross (Formierkreuz) is used for putting every limb into its correct position without affecting the growth of any other branches. The simple device, a cross of the length of the crown diameter, is tied at the centre to the leader at the desired height and the limbs are tied to its ends. The application of the formation cross is pictured, as is the " Seitenrichtklammer ", a wire clamp to adjust the annual growth to the required angle. This clamp, the working of which was described in a previous article (*ibid.,* 1943, 52: 369-71; *H.A.,* 13: 1187), has been used with great success at Wädenswil during the last 2 years.

1464. UPSHALL, W. H. 634.25-1.546
Methods in training peach trees.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 28-30.

In training a peach the tree as received from the nursery is normally pruned to a whip 42-48 inches high. Two-bud stubs are left where necessary to supplement the buds coming directly from the trunk. Branches and buds below the point where the lowest branch is wanted are completely removed. Two methods can then be adopted. Either shoots can be selected when 2 to 3 inches long and unwanted ones removed then=deshooting, or selection of branches can be made a year after planting and unwanted branches then removed=debranching. Trials for several years show debranching to be the better method, as it leads to fewer bad-angled crotches. Otherwise growth is similar.

1465. DAVIDSON, J. H., AND OTHERS.
577.15.04: 634.11
Thinning apples with the sodium salt of naphthyl acetic acid.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **27**: 352-6, bibl. 4.

NaNAA (10 and 20 p.p.m.) has produced marked thinning of the fruit of several varieties of apples. It was effective alone, with wettable sulphur, with wettable sulphur and hydrated lime and with lead arsenate present. Greatest thinning, sometimes too severe, occurred when applied at full bloom and applications just before or just after bloom were less effective than at full bloom but often adequate. Varietal responses vary greatly and a given variety apparently does not respond equally every year. Foliage injury has not been a factor in any case. No definite recommendation for the use of NaNAA can yet be made. [From authors' summary.]

1466. MILLER, E. J., NEAL, A. L., AND GARDNER, V. R. 632.95: 634.1/8
Emulsions for horticultural sprays. (A progress report.)
Quart. Bull. Mich. agric. Exp. Stat., 1945, **27**: 338-51, bibl. 6.

A method has been evolved of protecting transplanted trees, shrubs, etc., from moisture loss by applying a wax emulsion spray with standard equipment. The emulsion commercially known as "Dowax" consists essentially of microscopic particles of paraffin wax suspended in water-carrying colloidal clay (bentonite) and an emulsifier. It is the function of the clay to provide a framework for the wax particles which will prevent them from melting in hot weather, and at the same time to impart to the film sufficient porosity to permit of an adequate exchange of gasses. The mixture has proved its value under many conditions for reducing losses from desiccation. A further step in the development of the emulsion, which was originally designed for treatment of dormant nursery stock, was the elimination of foliage injury occurring on application during the growing season. This was achieved by substituting triethanolamine stearate for ammonium linoleate as emulsifier and by using a high speed emulsifying equipment. The progress of the work was greatly helped by the elaboration of accelerated tests for evaluating emulsions under laboratory and greenhouse conditions. Two methods, the determination of permeability of agricultural spray coatings to water vapour and the evaluation of foliage injury and water loss, are described. The spray eventually resulting from these researches was designated as T.S.S. It produces a transparent, inconspicuous film, which reduces transpiration for a sufficiently long period and is non-injurious to growing plants. Disadvantages of T.S.S. are that the concentrated emulsion must not be diluted with hard water and that the bentonite must be carried in a separate container until it is incorporated with the water immediately before use in the field. In the course of efforts to overcome these drawbacks another emulsion was developed which has extraordinary sticker qualities when added to insecticides and fungicides, as shown in a large number of field trials. Among the instances of successful application specified, the effect of the emulsion on Montmorency cherries may be noted in this connexion: When sprayed with a fungicide plus D-82 sticker an increase in the size of fruit of 7, 15 and 35% resulted from 1, 2 and 3 applications respectively. Other trials with the wax-oil emulsion T.S.S. indicate that it may be an ideal blossom control spray, since it thins merely by forming a coating over the stigmatic surfaces, without injury to blossom or foliage. Tabulated data are presented for an apple-thinning test with 1% T.S.S. (without the bentonite). It is believed that the sticker emulsion would produce equally satisfactory results. Finally, suggestions are made for semi-commercial thinning trials. Apart from thorough applications covering the entire tree, a "spot" application should be tried covering several sections of large limbs extremely thoroughly while leaving the rest of the tree unsprayed. A third method of application suggested, which would, however, not affect the biennial bearing habit, would be to concentrate the spray on the interior of the tree, thus reducing the setting of fruit on the lower and interior limbs.

1467. DORSEY, M. J., AND MCMUNN, R. L.
634.25-1.542.27
Tree-conditioning the peach crop. A study of the effect of thinning and other practices on size and quality of fruit.
Bull. Ill. agric. Exp. Stat. **507**, 1944, pp. 322-426, bibl. 126.

Of the controllable factors studied in different localities over a long period thinning had by far the greatest effect on size and quality of peaches. Moderately heavy pruning, as practised in Illinois, helps to correct overloading by cutting out about a fourth to a half of the fruit buds. The following recommendations are given for thinning: (1) Wait until the extent of the June drop can be appraised or till after the June drop. (2) Decide what should be the yield per tree. Elberta trees in full production, planted 25 feet apart, might, for instance, be suitably conditioned to yield a crop of 5 bushels. (3) Estimate the size class within which the fruit may be expected to fall and find out in the table given how many peaches of that size will make a bushel. Elberta peaches of the 2¼-2⅜ in. class, for instance, run about 250 per bushel. The number of peaches to be left on the tree after thinning should therefore be $5 \times 250 = 1{,}250$. (4) Select a type tree and thin uniformly throughout the bearing surface, leaving the desired load well distributed over the whole tree. The thinning crew should adjust their work to this model. Two summary, labour-saving methods of thinning which seem to hold some promise, are briefly mentioned namely brush-thinning at bloom and limb-tapping after the June drop. Since the peach enlarges as long as it is attached to the shoot, it is essential that picking should be delayed as long as possible. A table shows the increase in size from the green-ripe to the firm-ripe and the tree-ripe stage for fruits of 7 different size classes associated with different numbers of peaches per tree (3,000-500). The firm-ripe stage is described, there being no proper maturity test. Tree-ripe peaches, which are left 2-5 days longer on the tree, are fit for immediate use, but careful handling and transport in pre-cooled cars will allow of marketing. Cultural experiments showed that maturity may be delayed one week by a combination treatment of heavy pruning and heavy nitrogen applications.

1468. CROCE, F. M. 634.21-1.542.27
El raleo del damasco. **(Thinning apricots.)**
Rev. B.A.P., **28**: 333: 53-61.

The reasons for thinning apricots are, to increase the size of the remaining fruits, to improve the quality, to reduce the chances of the branches breaking, to reduce the expense of handling the fruit, and to maintain the vigour of the trees. Results obtained in California are quoted. The distance

apart allowed for the remaining fruit depends on the vigour of the fruiting branches. In humid regions where brown rot is rife the thinning should be more drastic than in drier areas.

1469. Kobel, F., and Bryner, W. 634.1/7-1.8
Die Düngung der Obstbäume. **(Manuring fruit trees.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 272-6, 287-94, being *Flugschr. Wädenswil Versuchsanst. Obst-, Wein- u. Gartenb.* **15**.

The defined aim of manuring is to produce trees of moderate vigour with moderate annual fruit bud production. Figures are quoted from a German source of the amount of minerals withdrawn from the soil by apple and cherry trees of different trunk circumference. A simple way of arriving at an estimate of the approximate nutrient requirements is to calculate the soil area covered by the crown and to apply about 30 g. of a 40% potash salt, 50 g. calcium cyanamide or 60 g. calcium nitrate or ammonium nitrate and 15 g. superphosphate or basic slag per square metre. Applications at this level will not cover the requirements of the grass if the trees are grown in sod. The visible symptoms of mineral deficiencies are summarized for the 5 most important nutrients. Next, an analysis of some twenty natural manures and artificial fertilizers is given. The complete fertilizers on the Swiss market appear to contain a higher dose of phosphate than is required on normal orchard soils. Among the possible methods of applying manures to fruit trees growing in sod the use of a lance for injecting fertilizer solutions into the soil is the *one most widely used in Switzerland** and most recommended by the authors. The lance is connected to a hand or motor sprayer, the tank of which contains a 5-10% fertilizer solution. After having determined the depth of the root zone the lance is adjusted by means of a disk so as to penetrate to the desired level. The instrument is operated by its insertion in the soil beneath the circumference of the crown at intervals of about 70 cm., and then in concentric circles around the tree, the radius being reduced by 1 m. every time. With old trees, the nearest circle should be about 1 m. distant from the trunk, with young trees about 40 cm. With each injection the calculated amount is applied, e.g. in the case of a 5% normal fertilizer solution 2 litres and in the case of a 10% solution 1 litre. Simple methods of timing the period of pumping so as to obtain the desired amount are described. Boron salts must not be added to the mixture to avoid the sprayer being damaged. If sufficient pressure is employed—but not beyond 10 atmospheres—the lance method will have the desired secondary effect of loosening the soil. Applications by this method may be made as late as the beginning of May. In case of heavy fruit set a supplementary application of a fertilizer solution (concentration not exceeding 5%) may be given at the end of June at the rate of 1 litre per square metre.

1470. Jouis, E. 634.1/8-1.8
La fumure des arbres fruitiers au pal injecteur. **(The use of the fertilizer lance in the orchard.)**
Ann. agron. Paris, 1942, **12**: 421-40, bibl. 4.

The lance used in these experiments was a Vitax made by the firm of Berthoud & Co. fitted with an apparatus† which recorded the amounts of solution used. This nearly doubled the cost but was reckoned indispensable. Another type, the Mapic, is also commented on favourably. The Vitax consists of a hollow metal tube fitted at the top with a double handle and a discharge pipe closed by a valve, which is controlled by a lever just below one of the handles. The lower part of the tube, which is about 45 cm. long, narrows to a diameter of 17 mm. and ends in a tempered steel, removable point. On this point there are four 2 mm. holes placed laterally at the bottom of small oblong depressions which help to prevent them getting blocked. A movable disk on the lance allows adjustment of depth and acts as a pedal for driving into the ground. When set at its highest point it allows the injection to be made at a depth of exactly 35 cm., and this was the setting used in the 1941 trials here discussed. Details are given of the recording apparatus and its adjustment. Previous experience with superphosphate and sulphate of potash had shown the necessity of using only fertilizers of very high solubility, and notes are given of preferences among these. Preliminary tests are described and calculations of volume of solution, number of injections required for a given size of tree are discussed at length, as is also the diffusion of the solution. Among conclusions reached are the following:—(1) The application of fertilizer by soil injection at root level should supplement basic manuring by the provision of nutrient in times of stress or when it is particularly needed for fruit production. It is particularly suitable for the application of phosphates and potash and in grass orchards. (2) Commercial fruit-growers will find their spray apparatus useful in application of the method. (3) A recording apparatus is a necessity. (4) Among materials particularly suitable are:—nitrate of soda, of ammonia, of potash; sulphate of ammonia; ammonium chloride; urea; purin; phosphate of ammonia, of potassium, of sodium (preferably the di-salts); chloride of potassium; sulphate of potassium. (5) The area of diffusion is very limited in the horizontal plane, varying in theory from 8·5 to 12·2 cm. for a soil of 40% porosity for 1 to 3 litres of solution injected, while in practice the amount of fertilizer found a little distance away is immensely less than that close to the holes. The unabsorbed fertilizer tends to sink. (6) Among the advantages of the methods are (*a*) speed and convenience, (*b*) capacity for giving immediate heavy doses, (*c*) precision as to amount, (*d*) increased possibility of readily studying the application of exact amounts of nutrients to given trees and roots, (*e*) provision of an easy method of studying the effect of micro-elements and therapeutics, (*f*) possibility of economy in manurial practice, once requirements have been decided.

1471. Jouis, E. 634.1/7-1.8
La fumure des arbres fruitiers. **(Manuring fruit trees.)**
Ann. agron. Paris, 1943, **13**: 14-6.

This report was one of those presented at the meeting of directors of French agricultural research stations in October 1942. Most of it is devoted to the author's very favourable notes on the use of the fertilizer lance for manuring fruit trees. The procedure is said to be a practical one for any farm provided with large-scale spray equipment. It is flexible, since little or much can be applied at will. It is quick: thus small trees needing 4 injections each will, on the average, require only 90 seconds each including passage from tree to tree. At Neufchâtel-en-Bray, using one horse and a movable spray tank of 250 l. capacity, two trained personnel and less than ½ l. petrol it was possible to manure 50 young trees at 2 m. apart by means of 6 soil injections each and 0·8 l. per injection in 90 minutes. It is an exact method, since it is possible to measure the exact amount given to each tree. Its future for investigations into fruit tree manuring is assured.—Rouen.

1472. Simon, G. 634.1/7(493)
Fumure des arbres fruitiers dans les possibilités actuelles. **(The manuring of fruit trees under war conditions in Belgium.)**
Conseils aux Membres Ligue pomol. Défense Fruit belge, 1944, pp. 21-39.

The paper, which was read before a meeting of the Ligue Pomologique pour la Défense du Fruit Belge in February 1944, discusses the basic principles of orchard manuring and makes recommendations for fertilizer applications in Belgian orchards under war conditions.

* *H.A.* editor's italics.

† Made by Cie des Compteurs et Matériel d'Usines à Gaz de Montrouge.

1473. SALGUES, R. 634.1/8-1.84+1.85
Études sur l'action de fumures azotées et phosphoriques en horticulture fruitière dans le midi de la France. **(The action of nitrogenous and phosphoric fertilizers in fruit growing in southern France.)**
Ann. agron. Paris, 1940, **10**: 256-69.

The effect of nitrogen and phosphorus fertilizers on yields per foot of tree and chemical composition of fruits was investigated for a period of years in peach, plum and pear orchards of Provence, while at the same time a study was made of the linear growth of branches, leaf development, quantity of fruit produced from the fourth year onward, sugar content of the fruit pulp and composition of the seeds. Before reporting the actual results a detailed description is given of the pruning treatment, which the main varieties, Hale's Early peach, Greengage plum and Beurré Clairgeau pear, received. Data of yields for the 3 tree fruits from siliceous and calcareous soils following 3 different nitrogen treatments are presented. The uniform result is that highest yields were produced by trees which had received no nitrogen, in addition to the basic pre-planting stable manure application, for the first 5 years, but a relatively high dosage from the sixth year onwards when the orchards were in full production (group B). The group of trees which had received regular nitrogen applications up to the time of cropping, but no further, came second (group C), while excess of nitrogen brought about by annually renewed applications was the cause of lowest yields in the third group (group A). From an additional experiment conducted with Hale's Early peaches the conclusion is drawn that maximum yields are obtained by fertilizing liberally with nitrogen, and that copious applications of phosphorus will be rewarded by earliness. The effect of phosphorus on the vegetative development of Hale's Early differed slightly from that produced on the peach variety Amsden. Irrespective of variety and soil, however, it was found that branch production and leaf surface following high applications of phosphorus (800 kg. superphosphate on calcareous soils and 1,200 kg. basic slag on siliceous soils) differed only insignificantly from that of trees which had received a considerably lower dosage (200 and 400 kg. respectively), while leaf colouring was somewhat inferior in trees of the first category. The effect of nitrogen applications on the peach varieties Red Magdalen and Pavie Jaune is described as being conducive to the development of small branches associated with a slight reduction in medium long ones and to an increase in the surface of leaves accompanied by a reduction in colour intensity and therefore in functional value. In respect of fruit composition it was found that with peaches high applications of phosphorus favour the accumulation of sugars in the fruit and consequently better ripening characterized by maximum fructose and saccharose content. In the trials with 3 nitrogen treatments (see above), group B consistently showed the lowest sugar content in all the tree fruits, group C fruits being slightly but consistently better than group A fruits. Fruit of all varieties from trees growing on calcareous soils had a higher sugar content than those grown on siliceous soils. In another experiment with Red Magdalen and Pavie Jaune peaches nitrates were found to induce a significantly higher sugar content in the fruit than ammonia.

1474. ANON. 634.1/8-1.8
Fertilizantes. **(Fertilizers.)**
Sugest. oport. Rio Negro, July 1945, 4 pp.

The writer points out that inorganic fertilizers have been used for fruit trees without any consideration of the actual requirements of the trees. In compounding a so-called complete fertilizer certain facts have to be borne in mind. It is stated, for instance, that fruit trees require less of a phosphatic fertilizer than of a nitrogenous one; that an apple tree on Northern Spy rootstock needs more potassium in proportion to other elements than a pear tree; and that the vine demands more phosphoric fertilizer than the apple or pear. Recommendations for the proportions of NPK in complete fertilizers for apple, pear and vine are: apple 6: 5·50: 6·50; pear 7·50: 4·50: 1·50; vine 9: 10·00: 0·09; apple in exceptional cases 6: 4: 10·00. The last is to be used only when certain symptoms appear [presumably symptoms of potash deficiency]. The application of inorganic fertilizers in relation to green manuring is discussed.

1475. MERRILL, T. A., AND SPRINGER, G. 634.23-1.8
An experiment in the placement of orchard fertilizers.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **27**: 357-9.

Two photographs of Montmorency cherry trees growing in Kentucky bluegrass sod clearly show the greater benefit derived from band applications of nitrogenous fertilizers under the circumference of the branches than from spreading an equal amount between the rows, the grass absorbing most of it in the latter case before it reaches the tree roots. The band should be limited to a width of 12-18 in.

1476. WALTMAN, C. S. 634.25-1.84
Effects of fall application of nitrogen fertilizer on the soluble nitrogen and phosphate phosphorus content of dormant peach twigs.
Bull. Ky agric. Exp. Stat. **457**, 1944, pp. 16, bibl. 14.

The application in October of 1 and 2 lb. calcium cyanamide per peach tree resulted in a net decrease in the proportion of soluble nitrogen in the twigs during the dormant season. A net gain in soluble nitrogen, as compared with the check trees, was recorded following 2 and 4 lb. applications of ammonium sulphate and sodium nitrate, although there was a general downward trend in the percentages of soluble nitrogen during the winter regardless of fertilizer treatment. The phosphate phosphorus content of the twigs and the fruit yields were not significantly affected by the kind and amount of fertilizer used. These conclusions are based on frequent analyses of 30 uniform 7-year-old South Haven peach trees made between 26 September 1940 and 10 April 1941.

1477. MCKENZIE, W. F., AND NEAVERSON, C. V. 634.1/7
The renovation of established orchards.
Kirton agric. J., 1945, No. 10, pp. 36-9.

Practical hints on how thinning, pruning, manuring, spraying and adequate provision for pollination may be effective.

1478. ORTEGA NIETO, J. M. 634.63-1.8
Estudio sobre experimentación en el olivar. Aplicación a una experiencia de fertilización nitrogenada en el olivo. **(An experimental study in an olive-grove. Experimental application of nitrogenous fertilizers to olive trees.)**
Bol. Inst. nac. Invest. agron. Madrid, 1944, **11**: 281-315.

Analysis of covariance has been applied to a 2-years experiment on the action of nitrogenous fertilizers on olive trees. The difference of production in the second year between the treated trees and those not treated was very significant; in the first year, however, the result was the reverse. Taking into consideration the average production of this olive grove, the use of the fertilizers lessened somewhat the variability of the plantation in the year of the greater crop.

1479. BOYNTON, D., AND COMPTON, O. C. 634.1/7: 581.192: 631.8
Leaf analysis in estimating the potassium, magnesium, and nitrogen needs of fruit trees.
Soil Sci., 1945, **59**: 339-51, bibl. 29.

On weighing the reliability of the method of leaf analysis for estimating the potassium, magnesium and nitrogen needs

of fruit trees against its limitations the authors conclude from a review of the literature, which is supported by their own data, "that chemical analysis of leaves for these constituents cannot take the place of careful observations on tree behaviour and appearance, on the development of visible leaf or fruit symptoms, and on past climatic and management conditions; but that chemical analyses of leaves, coupled with these observations, may make possible a positive diagnosis that neither alone would have permitted." —Cornell University, Ithaca.

1480. THOMAS, W. 581.192: 631.8
Present status of diagnosis of mineral requirements of plants by means of leaf analysis.
Soil Sci., 1945, **59**: 353-74, bibl. 8.

The subject reviewed is dealt with under the following heads: Influence of certain older procedures. The modern approach. Selection of material and sampling technique (choice of tissue; comparative nature of all procedures of diagnosis; sampling procedure; influence of fruiting). Preparation of samples for analysis. Observations on method of chemical analysis (the form of combination of the element; analytical procedures). Treatment of analytical data (the unit of measurement; the base of reference). Interpretation of results (two main schools of thought; practical application of the principle of minimum ranges; interactions of a metabolic nature; methods of examining interrelationships; integration of growth to meteorological conditions). Summary and conclusions.

1481. PICKFORD, P. T. H., JONES, J. O., AND TODD, J. C. 631.87 + 631.849
Investigations on composting. Straw-sludge composts. Progress report 1.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 110-4.

As a result of experiments in Somerset the authors report that "Satisfactory rotting of straw takes place in straw/sludge compost heaps with about one and a half parts of sludge dry matter to one part of straw, provided the heap is satisfactorily wetted and aerated. An average yield of 5¼ tons of compost was obtained at the end of six months from one ton of straw and 1½ tons of sludge dry matter. A more even temperature was obtained when aeration was most satisfactory. This was the case when the heap was built on straw bales. The nitrogen and phosphate content of straw/sludge compost is comparable to an average sample of farmyard manure."

1482. CHAPLIN, C. E. 634.25-1.459
Soil conservation on the University Farm at Olney.
Ill. Hort., 1945, Vol. 34, No. **1**, 2 pp.

Terracing has proved a very effective means of checking sheet erosion and stopping gullies in an 80-acre peach orchard at Olney, Ill.

1483. STEVENSON, H. A. 634.1/7-1.459
Soil conservation in the Mount Arbor Nurseries.
Ill. Hort., 1945, Vol. **34**, No. 1, extracted from *American Nurseryman*, 3 pp.

The measures for soil conservation successfully applied in the Mount Arbor Nurseries at Shenandoah, Iowa, are described. There, the severe puddling and breakdown of the soil structure due to the removal of nursery stock in wet weather is remedied by perennial sod crops consisting of a brome grass-alfalfa combination. Contour tillage, the construction of terraces, grassed waterways and sod buffer strips and windbreaks against soil erosion are also discussed.

1484. MERRILL, T. A. 634.1/7-1.874
A new orchard cover crop—domestic rye grass.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **27**: 107-8.

The advantages of domestic rye grass (*Lolium multiflorum*) over common rye as an orchard cover crop are specified: Seeded shallow at the rate of 12-15 lb. per acre from the middle of August until the middle of September, it makes enough autumn growth to give ample soil cover. No clipping is required before the harvest of winter apples, and growth in spring is not so rapid as to interfere with tree growth and cultivation before the cover crop is ploughed in. Although domestic rye grass does not grow quite so tall, the amount of organic matter returned to the soil is equal to that obtained from ordinary rye owing to the greater density of its growth which, at the same time, secures considerably superior erosion control. The reputation that domestic rye grass is liable to winter killing appears to be undeserved. The trials were carried out in several areas in Western Michigan, including a wide range of soil conditions.

1485. UPSHALL, W. H., AND BRADT, O. A. 634.1/7-1.423.4
Organic matter studies.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 5-10.

An account is given of an investigation into the relative values for building up and maintaining soil organic matter in the orchard of various green-manure crops and sods in combination with varying manuring and cultural practices. The annual green manure crops used included buckwheat, various rye combinations, soybeans and weeds, while sod treatments have included alfalfa (lucerne) and blue grass (Timothy) sods. Yields of green-manure crops and of sod mowings are tabulated. Changes in soil organic matter under the different treatments are being observed and are here briefly discussed.

1486. UPSHALL, W. H., AND VAN HAARLEM, J. R. 634.1/8-1.547.6
Quantity and quality of fruit as affected by stage of maturity at picking time.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 16-7.

The fruits considered are cherries, plums, peaches and pears, and a full report is promised later.

1487. SWARBRICK, T. 634.11-1.55: 577.15.04
The prevention of pre-harvest drop in apples.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 30-6, bibl. 5.

These trials of α-naphthaleneacetic acid on Beauty of Bath and of this substance, β-naphthoxyacetic acid and 2-4 dichlorophenoxyacetic acid on Worcester Pearmain confirm previous results in England and America that α-naphthaleneacetic acid used correctly can be relied on to prevent or delay pre-harvest drop. The other two chemicals used in this trial were not so successful. Only a single application was made, and this was within 10 days of the expected heavy fruit drop. A concentration of 10-20 p.p.m. was used. As a result of the treatment the sprayed Beauty of Bath apples completely ripened while still on the tree. Many fruits then split and fell, leaving the stalks still attached. The sprayed fruits of Worcester were also still very firmly attached when picking took place. In both varieties spraying not only reduced the drop, but gave improved fruit quality, a most important economic consideration in normal times. Complete coverage by the spray is essential and the substance must actually come into contact with the apple stalk. It is evident that α-naphthaleneacetic acid can now be used satisfactorily for the prevention of pre-harvest drop. Presumably, as it becomes more plentiful and cheaper, the process will become increasingly worth while or alternatively other cheaper substances may prove equally efficacious.

1488. VYVYAN, M. C. 577.15.04: 634.1/2-1.55
Sprays to prevent pre-harvest drop of fruit.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 118-9.

The use of growth substances sprayed on the trees to prevent fruit drop is described. Practical recommendations include

notes on (1) varieties worth spraying, (2) occasions when it is worth spraying, (3) materials to use, (4) strength of sprays, (5) quantities per tree, (6) time of application, (7) time to pick.

1489. DUNNE, T. C. 634.11-1.55: 577.15.04
Spraying to reduce pre-harvest drop of apples.
J. Agric. W. Aust., 1944, **21**: 33-4.
Preliminary spraying trials on a limited scale showed that Clingspray and Phyomone, the two proprietary hormone preparations tested, are effective in controlling fruit drop of Jonathan and Delicious under a variety of Western Australian conditions. Spraying should be done about 3 weeks before the normal harvesting time or when dropping of nearly mature fruits is observed.

1490. TUKEY, H. B., AND HAMNER, C. L. 634.11-1.55: 577.15.04
Aerosol application of growth regulators to retard abscission of apple fruits.
Science, 1945, **101**: 253-4, bibl. 7, being *J. Art. N. York agric. Exp. Stat.* **615**.
Dwarf and semi-dwarf 8- to 9-year-old apple trees of the McIntosh, Macoun and Kendall varieties were treated with naphthaleneacetic acid by the aerosol method, i.e. by a mixture of the growth substance and a carrier solvent, which is held under pressure dissolved in a liquefied gas and is released in a very fine mist. The aerosol, consisting of ·25% naphthaleneacetic acid, 5% lanolin and 94·75% dimethyl ether, was applied by means of a "Sure Shot Pressure Sprayer" which has a weight of about 2 lb. The treatment was begun on 18 September and repeated 4 times at 7-day intervals. It reduced the drop very markedly, with McIntosh, for instance, to 25% up to 12 October as against 64% in unsprayed controls and 22% and 26% respectively in trees sprayed in the orthodox manner with naphthaleneacetic acid Carbowax-water and naphthaleneacetic acid-alcohol-water mixtures. At the rate used, viz. 40 mg. growth-regulating substance per bushel of fruit, 1 lb. aerosol containing ·25% naphthaleneacetic acid is equivalent to 28¼ gal. water spray containing 10 p.p.m. of growth substance. The dosage used was probably unnecessarily high, so that in practice the ratio would even be more strikingly in favour of the aerosol method. An aerosol of 2-4 dichlorophenoxyacetic acid proved also effective in controlling fruit drop and inducing better colouring. The application by the aerosol method of fungicides and insecticides to small trees and the development of equipment for aerosol applications to large trees is anticipated.

1491. BATJER, L. P., AND MARTH, P. C. 634.11-1.55: 577.15.04
New materials for delaying fruit abscission of apples.
Science, 1945, **101**: 363-4, bibl. 1.
The efficacy of ·001% naphthaleneacetic acid sprays in reducing fruit drop of Winesap apples was markedly increased, both in duration and in intensity, by the addition of 0·5% Carbowax (a polyethylene glycol). The effective period of the naphthaleneacetic acid and Carbowax combination was even surpassed by a 2,4 dichlorophenoxyacetic acid (·001%) treatment, which was, however, inferior during approximately the first 12 days following application. It is suggested that 2,4 dichlorophenoxyacetic acid be tested in (1) concentrations higher than 10 p.p.m., (2) applications at an earlier stage of maturity and (3) combinations with Carbowax and/or naphthaleneacetic acid.—Agricultural Research Administration, Beltsville, Md.

1492. BEAR, E. M. 634.11-1.55: 577.15.04
Pre-harvest dropping of apples.
Fruitgrower, 1945, **100**: 139-40.
A grower reports good results from a spraying trial with a commercial preparation of α-naphthaleneacetic acid against pre-harvest drop in Beauty of Bath. It is suggested that hormone applications might prove useful also with late varieties in the case of a picking season prolonged owing to shortage of workers. Scientists are invited to produce a hormone dust for this purpose.

Noted.

1493.

a BECKER-DILLINGEN, J. 634/635: 631.8
Handbuch der Ernährung der gärtnerischen Kulturpflanzen. **(A manual on the nutrition of horticultural plants.)**
P. Parey, Berlin, 1944, pp. 526, 3rd revised edition, RM. 19.80, from review *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 27.

b KEMMER, E. 634.1/7: 581.145.1
Die Blühreife und ihre besondere Beeinflussung im Obstbau. **(The age at which a fruit tree comes into bearing and how it can be influenced.)**
Merkbl. Inst. Obstbau Berlin, 1943, **12**, from review *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 23.

c WALKER, J. 632.183
Pruning, thinning and utilizing trees, with special reference to prairie farm shelterbelts.
Publ. Dep. Agric. Canada, **770**, 1945, pp. 7, being Circ. **176**.

d WILSON, G., AND UPSHALL, W. H. 634.25 + 664.85.25
Experimental shipments of fruit from Vineland.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 17-8.
A colour chart for determining the maturity of peaches is included.

SMALL FRUITS, VINES AND NUTS

1494. COMMISSION POMOLOGIQUE ROMANDE. 634.1/7(494)
Arbres et arbustes à petits fruits. (Nouvelle pomologie romande illustrée, II. partie.) **(Small fruit. A new illustrated pomology for French Switzerland, part II.)**
V. Attinger, Neuchâtel, 1945, Fr. 12.40, from review *Schweiz. Z. Obst-u. Weinb.*, 1945, **54**: 404.
The second volume includes, apart from soft fruit, also walnuts, hazelnuts, chestnuts and almonds as well as some rare kinds of fruit and wild fruits.

1495. POWERS, W. L. 634.7-1.811.6
Epsom salts and nutrient value of berries.
Science, 1945, **101**: 301.
The application of 30 lb. per acre of magnesium sulphate on Amity silty clay loam gave the highest increase in gooseberry yields obtained in extensive fertilizer trials. Epsom salts also improved cane growth and appearance of foliage. High applications of potash for the control of leaf scorch were found to increase the tendency to leaf blotch by reducing the availability of magnesium in the soil. The vitamin C content of boysenberries from a plot treated with 40 lb. per acre of magnesium sulphate was shown to be 24% above that of berries from an untreated check plot. Raspberries had 4% more vitamin C when grown on a plot treated with magnesium sulphate.—Oregon State College.

1496. GRUBB, N. H., AND HARRIS, R. V. 634.711
The planting and maintenance of raspberry cane nurseries.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 109-13.
Success in raspberry culture depends on a supply of healthy well-rooted planting canes true to name. Cane nurseries

(or spawn beds) are recommended as sources of new canes when planting up. The advantages are (1) a greatly increased output of well-rooted planting cane per acre, (2) easier and more efficient inspection and roguing for purity and freedom from diseases, (3) each harvest of planting canes is ensured freedom from important fungus diseases, e.g. cane blight and cane spot, and (4) there is much less risk of the stock becoming mixed with self-sown seedlings. The planting, maintenance, roguing, harvesting and productivity of the nurseries are described.

1497. ANON. 634.711 +634.75
Disease-free raspberries and strawberries.
Gdnrs' Chron., 1945, **118**: 114.

A brief report on a meeting of fruit growers arranged by the North of Scotland College of Agriculture. It was the purpose of the meeting to discuss the establishment, in the north-east of Scotland, of a nursery for the raising of disease-free stocks of raspberries and strawberries in sufficient numbers to supply the whole of Great Britain. According to J. Morrison, the area from the middle of Kincardineshire to Caithness is remarkably free from the insect vectors of virus and other troubles.

1498. WATT, J. H. 634.711
Raspberry culture in New Zealand.
N.Z. J. Agric., 1945, **70**: 603-10.

An account of raspberry cultural practice in New Zealand, where the raspberry is the most extensively planted soft fruit.

1499. SCHÜTZ, F. 634.711
Himbeer-Neuanlagen. (**New raspberry plantings.**)
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 367-71.

The description of new raspberry plantings includes a discussion of suitable varieties, among which the two Wädenswil productions, Andenken an Paul Camenzind and Rote Wädenswiler are named in the first place. Lloyd George is recommended as the best variety to bear two crops a year if planted in a sheltered position.

1500. MURRILL, W. A. 634.715: 575.252
A white blackberry.
J. Hered., 1945, **36**: 217-8.

Two colonies of white-fruited sand blackberries were found near Gainsville, Fla, and in the Alachua County respectively and named *Rubus cuneifolia* f. *albifructus*. The sand blackberry produces an abundant crop of delicious fruits without cultivation. It is therefore thought possible that the new find may be developed by breeding and selection and may supply the demand for a white blackberry variety, which would not blacken fingers and teeth. Seeds from open-pollinated white plants, which are self-incompatible, produced a black offspring.

1501. DOEHLERT, C. A. 634.73-1.535
Propagating blueberries from hardwood cuttings.
Circ. N. Jer. agric. Exp. Stat. **490**, 1945, pp. 8.

An illustrated description of practices, which will ensure growth in 50-80% of blueberry hardwood cuttings planted in specially constructed propagating beds.

1502. DORAN, W. L., AND BAILEY, J. S. 634.73-1.535
Propagating the high-bush blueberry by softwood cuttings.
Reprinted from *Amer. Nurseryman*, 1945, **81**: 10, being *Contr. Mass. agric. Exp. Stat.* **554**.

The results obtained in 1944 were in general agreement with those reported in more detail for 1943.* Cuttings taken 21 June, when the berries were above ¼ in. in diameter, produced better root systems than those taken 5 July, while untreated material from 18 July failed to root altogether. The conclusion drawn from 2 years' trials is that cuttings should be taken not later than 2-3 weeks before the first berries ripen. Treatment with a root-inducing substance has again proved beneficial. Of the materials compared β-(indole-3)-propionic acid and potassium indolebutyrate gave the best and second best results respectively, an 18-hour solution immersion treatment being recommended. The 50% dilution of Hormodin No. 2 with the fungicide Spergon appeared promising, but requires further trial.

* *Bull. Mass. agric. Exp. Stat.* 410; *H.A.*, 15: 77.

1503. OLDHAM, C. H. 634.75
Strawberries.
Bull. Minist. Agric. Lond. **95**, (2nd edition), 1944, pp. 67, 2/-.

The changes introduced into this second edition are unobtrusive but useful. Thus the section on choice of strawberry varieties has been brought up to date and more information is available on the suitability of particular varieties for canning. The statistical information and that on experimental research has also been revised and now includes a brief note on the East Malling work on clonal stock production. Advice on manures is based on peacetime facilities, which doubtless will recur in course of time.

1504. DAVIS, M. B., AND OTHERS. 634.75(71)
The strawberry and its cultivation in Canada.
Publ. Dep. Agric. Canada **621** (revised), 1945, pp. 48, being *Fmrs' Bull.* **63**.

The 1938 edition of the bulletin (see *H.A.*, 9: 443) has been reprinted with a few alterations including changes in the list of varieties and a slight modification of the dosages recommended for fertilizer application. Statistical figures have been brought up to date.

1505. ROGERS, W. S. 634.75: 351.823.1
Strawberry runner supplies and certificates.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 113-5.

With the termination of the Ministry of Agriculture's Strawberry Nuclear Stock Scheme, the measures taken to ensure the continued supply of healthy plants, by means of the Special Stock and Ordinary Certificates, are described. Growers are strongly recommended to buy only certified plants. Special stock plants have the highest standard, and should be used where possible, especially for further propagation.

1506. (STRONG, W. J.) 634.75-1.523
Strawberry breeding.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 48-56.

The several objectives of strawberry breeding work at Vineland have been grouped under seven projects which are as follows:—(1) Improvement in early varieties, (2) use of English varieties for improvement in quality, (3) ease in hulling, (4) improvement in preserving varieties, (5) variety improvement generally, (6) resistance to root rot, (7) varieties for quick-freezing preservation. Tables give a concise account of the work between 1913 and 1944. The work has in certain aspects been discouraging, thus initially promising selections submitted to a 50-foot row test are very often found wanting. The weaknesses then discovered are many, notably:—fruit size, firmness, quality, appearance and yield, root rot, virus, plant vigour.

1507. BRIERLEY, W. G., AND LANDON, R. H. 634.75-2.111
Winter behavior of strawberry plants.
Bull. Minn. agric. Exp. Stat. **375**, 1944, pp. 24.

Metabolic activity during the dormant season and winter hardiness of strawberries were studied in potted plants in the laboratory. The tabulated data show that in view of the very small amount of oxygen required the occasional death of mulched and snow-covered strawberry plants cannot be attributed to smothering. The common practice of covering strawberry fields with 3 in. of straw was found to provide adequate protection for a temperature drop below 21° F., described as the "danger point" for fully mature and hardened plants. The "killing point" was determined to be a temperature of approximately 10° F. The right

timing of mulching proved to be a most important factor in the prevention of frost injury. The plants should be hardened by light frosts previous to mulching, but the temperature at the crowns must not be allowed to fall below 20° F. before the cover is applied. The frost hardiness acquired by the new growth in spring appears to be inferior to that shown by the dormant plants in late autumn and winter. June-bearing varieties were found to be more cold-resistant than those of the autumn-bearing type.

1508. LENANDER, S. E. 634.75
Jordgubbssorten Southland. **(The strawberry variety Southland.)**
Fruktodlaren, 1943, No. 4, pp. 107-8.
In comparative trials at Alnarp and Rånna the American strawberry variety Southland proved so much more prolific than the best Swedish commercial varieties (65-70%) that it is strongly recommended for general introduction. Southland is not fit for preserving but is very resistant to diseases. The variety being self-sterile, a few sorts are suggested which may be planted with it.

1509. COOPER, J. R., AND VAILE, J. E. 634.75-1.8
Effect of fertilizers, soil reaction and texture, and plant stand on the performance of strawberries.
Bull. Ark. agric. Exp. Stat. **454**, 1945, pp. 55, bibl. 6.
Perhaps the most important result of this study of the effects of fertilizers and cultural treatments on strawberries, carried out at the Main Agricultural Experiment Station, the Fruit and Truck Branch Experiment Station and later at the Cotton Branch Experiment Station as well as on several farms in Washington and White Counties from 1928 to 1943, was that the productivity of old soils built up by the use of fertilizers and organic matter proved to be just as high as that of the best newly cleared soils. This finding contradicts the common belief of Arkansas growers that the crop will thrive only in the latter type of land. Another valuable result is the observation that bearing strawberry fields derive the greatest benefit from fertilizers if the dosage is split, half of the amount being applied in June after harvest, the other half in February. The rates recommended for Newtonia (silt loam) and Ruston (fine sandy loams) soils are 500-600 lb. per acre of a 4-12-4 fertilizer and 600-750 lb. of a 5-10-5 fertilizer respectively. In view of heavy weed competition on Newtonia soils, annual applications of manure to bearing strawberries were found to be profitable only on Ruston soils. However, the use of stable manure and green manure prior to planting proved very desirable in both cases. Optimum yields per acre were obtained at stands of about 8 plants per square foot on Newtonia soils and of 10 plants on Ruston soils. Renovation of the planting (removal of a part of the plants to encourage the setting of new plants) was found to depress yields. Moderately acid to neutral soils of intermediate texture were shown to be most suitable. The following mulching practices are recommended: Heavy mulching with straw in winter, covering the plants during periods of frost hazard in spring, but removing the mulch immediately afterwards, and light summer mulching to keep the berries free from sand. A discussion of the effect of different weather conditions stresses the importance of a favourable water supply.

1510. HOFFMANN, H. 634.8
The wine industry of South Australia.
J. Dep. Agric. S. Aust., 1945, **48**: 313-5.
A brief survey of the problems and practices of vine growing in South Australia by an experienced grower.

1511. BORDAS, J. 634.8
Les vignobles de sable en Camargue. **(Vine growing in the sands of the Camargue.)**
Ann. agron. Paris, 1944, **14**: 215-20, bibl. 5.
The vineyards of Camargue are subject to a semi-desert climate with dry hot summers and dry winters and to soils, more than 95% of which is sand. Phylloxera cannot live under these conditions of soil and hence the vines are on their own roots, ungrafted. The mistral, a strong north-west wind, tends to cause erosion, and to avoid this rushes are incorporated into the rows between the vines, thus binding the sand. The vine, which prefers the bare hillside to good alluvial soil for the production of good quality wine, will flourish here where hardly anything else will, and gives an excellent return for extremely little attention.

1512. ROBERTS, O. C. 634.8
Grape culture in Massachusetts.
Ext. Leafl. Mass. St. Coll. Ext. Serv. **64** (revised), 1943, pp. 16.
There seems to be plenty of scope for grape growing in Massachusetts. All the varieties recommended are of the American type.

1513. MAUME, L. 634.8-1.8
Études biochimiques sur vignes dans les sables du cordon littoral méditerranéan. **(Biochemical studies of vines in the sands of the French Mediterranean coast.)**
Ann. agron. Paris, 1942, **12**: 543-64.
Signs of decline had become evident among the ungrafted vines of the southern French vineyards in the neighbourhood of Aigues-Mortes and Sète and in consequence the author was called in to determine by his method of leaf diagnosis what was wrong. He found considerable differences in the nutritional chemistry of these vines growing in sand and those of Aramon grafted on Rupestris growing under favourable conditions. In the former he found in every case that nitrogenous and potassic nutrition was very small and further that the NPK equilibria in the leaf were often extremely different to the optima found for Aramon-Rupestris except in the case of one vine, Calvière, where figures showed a good balance. Certain preliminary attempts to remedy the conditions by the addition of manure and fertilizers offered promise, especially for the regeneration of young vines, but some of the older vines showed no response to treatment.—Station de Recherches Chimiques, Montpellier.

1514. DEMOLON, A., GESLIN, H., AND POLI, C. 634.8: 581.035 + 581.036
Observations écologiques sur une vigne cloisonnée. **(Ecological observation on a vine.)**
Ann. agron. Paris, 1943, **13**: 404-14, bibl. 9.
The authors have made careful observations on the vegetative behaviour of the different aerial parts of a Chasselas vine planted outside a cold greenhouse in a fertile soil and grown with two main branches, one of which was trained outside and the other inside the house. Results which concern the dates of the different stages of growth, differences in growth of leaves and shoots and differences in chemical composition of different organs are here set out, and among the author's conclusions are the following:—The growth of a plant, i.e. the amount of dry matter formed, depends (1) on its assimilatory activity relative to its leaf surface, (2) on its total leaf surface, and it is expressed by the product of these two values. In the present trial, it being remembered that growth continued longer under glass, assimilatory activity was much the same in both cases. In other words the higher temperature and hence increased chlorophyll made up for decreased light. On the other hand the lack of equilibrium resulting from the modification of the value of the temperature/light intensity ratio, which was 2 to 2·5 times higher inside the house than outside, was responsible for an increase in leaf surface, which may be considered as the essential factor in growth acceleration. Obviously this ratio presents an optimum which varies with the nature of the plant and its state of development. Owing to the vigour which accompanies it this optimum is, in the vine,

incompatible with good fruiting, which requires for such a temperature a higher light intensity. That is why, under our climatic conditions, we often open up glasshouses during summer and why vine culture is practised at high altitudes in the tropics. This action of light in connexion with growth hormones needs further study. The essential thing to realize is that, as light diminishes, vegetative growth increases, provided temperature simultaneously increases. Such were the conditions noted under glass in the present trial. This trial, carried on over a series of years, shows how very important external factors are to the growth of the vine. In practice temperature appears to be more important than light, thus, reducing the intensity of light by 30% and raising the average temperature by 5° C. quintupled growth activity. But in general results show the importance of light. Ecology must take into account not only the length of day but also the intensity of the light afforded.—Versailles.

1515. Rodrigues, A. 634.8: 581.4
O polimorfismo foliar e os estudos de filometria, aplicação prãtica de um método ampelométrico. **(Foliar polymorphism and phyllometrical studies a practical method of measurement applicable to the grape vine.)** [English summary ¾p.]
Agron. lusit., 1942, **4**: 339-59.

Accurate methods are necessary in order to show the relation between polymorphism (particularly vein differentiation) and the physiological state, nutritional conditions, leaf fall, influence of rootstock, altitude at which the plant is growing, the nature of light radiations, photoperiodism, radioactivity from the soil, proximity to the sea, etc. The practical application of the ampelometric method consists of measuring the length of the median main vein and the co-ordinates of the vein vertices relatively to two axes, placing the most symmetric leaf on a sheet of graph paper; these co-ordinates are further reduced by means of a nomogram to a standard length of the median main vein, the new co-ordinates are marked on another sheet of graph paper with regard to the class length of the median main vein, and the mean points corresponding to the vertices of the veins are statistically calculated. These data together with the mean number of teeth of each of the three portions in which half of the leaf is divided by the main veins (taking into consideration the order of the nerves which go to the teeth) make it possible to draw accurately the " average leaf " of the population under study.

1516. Branas, J., Bernon, G., and Levadoux, L. 634.8
Expression ameliorée de la qualité des produits chez *Vitis vinifera* L. (Aramon). **(An improved method of estimating quality in vine products.)** Reprinted in 1941 from *Progr. agric. vitic.*, 24 pp., bibl. 4.

For those who like to use symbols for the determination of qualities which are difficult to estimate and express, this and a previous article (*H.A.*, 8: (1018)) should prove of the greatest interest. The authors hope to apply their methods to tests of different systems of pruning, spacing, training, thinning, etc.

1517. Covas, G., and Christensen, J. R. 634.8: 519
Determinación del tamaño de parcelas para ensayos comparativos de rendimientos en la vid. **(A determination of the size of plots for comparative yield trials in the vine.)**
Rev. argent. Agron., 1945, **12**: 26-9.

The vineyard used for the experiment consisted of 50 rows with 50 plants in each. The widths of the plots were 1, 2, 3 and 6 rows (1·8, 3·6, 5·4 and 10·8 m. respectively), and the lengths 4, 6, 8, 12 and 16 plants (4·8, 7·2, 9·6, 14·4, 19·2 and 28·8 m. respectively). The conclusions arrived at by the authors were that:—in the plots of one row only there were fewer experimental errors than in those of 2, 3 and 6 rows; except in the plots of one row in width the experimental error increased almost always in direct relation to the length of the plots; the smallest plot is the most efficient. In order to obtain a standard error less than 2% of the average three replicates are required in a plot of this kind.

1518. Gruzdev, G. I., and Peresvetov, A. S. 634.8-1.4
Soil and botanical conditions in relation to the growing of champagne grape varieties [in the districts of Anaga, Abrau-Djurso, and Gelendzik]. [Russian.]
Počvovedenie (Soil science), 1940, No. 10, pp. 67-87.

The petrographic, chemical, and physical properties of soils situated on various slopes and terraces are described. The root systems and some other aspects of the vines growing on these soils are also described, three varieties of vine being considered. It is concluded that the limey and stoney soil, combined with the adequate light and warmth of the districts mentioned, are suitable for the growing of grapes. The depth and nature of the soil differ from one situation to another, dissimilar methods of cultivation being therefore required; also certain varieties are more suited than others to particular aspects and situations. The application of humus manures are of special importance to some of the soils, both to conserve moisture and give protection against cold. A system of successive manuring is explained.

1519. Anliker, J., and Kobel, F. 634.8-1.535: 577.15.04
Wuchsstoffversuche mit Rebveredlungen. **(The use of growth substances in vine propagation.)** [French summary, ¾ p.]
Landw. Jahrb. Schweiz., 1945, **59**: 203-48, bibl. 28.

Preliminary trials with cuttings of the vine variety Riesling × Sylvaner possessing one bud showed that heteroauxin and a proprietary hormone preparation, Roche 202, increased root formation and suppressed shoot growth as the concentration increased. A suitable hormone concentration, however, applied for the right length of time was found to promote root formation markedly, while it allowed of sufficient shoot growth. The main effort of the extensive experiments during 1938-43 was directed towards improving the percentage of take in grafting vines by hormone treatment. However, in spite of many different methods tried with 65,000 grafts no uniform results were obtained and no general recommendation concerning the application of hormones in vine grafting could be made. A full account of the experiments is given.—Wädenswil Experiment Station.

1520. De Freitas, A. G. B. 634.8-1.541.11/12
Influência da enxertia no sistema radicular dos porta-enxertos. **(Influence of scion on root-system of vine rootstock.)** [English summary, ½ p.]
Agron. lusit., 1942, **4**: 313-21.

Experiments were conducted to determine the influence of the scion on the root development of the rootstock, using two different rootstock varieties of the grape vine, grafted and ungrafted. For the same volume of soil (one cubic metre) the ungrafted vines showed greater root development than the grafted. It is concluded that, as grafting may alter the vegetative habit of the root system of the rootstock the idea of stock adaptation ought to be abandoned and the notion of a " stock-scion complex " adopted instead. The study of ungrafted vines has a very limited interest and such results can give only preliminary information regarding further use of the variety tested, for under cultivation the vine is [nearly] always grafted.

1521. REYNOLDS, H., AND VAILE, J. E. 634.8-1.541.11
Effects of rootstock upon composition and quality of fruit of Concord, Campbell Early and Moore Early grapes.
Bull. Ark. agric. Exp. Stat. **421,** 1942, pp. 39, bibl. 10.
As a result of 3 years' trials certain rootstocks are named, which will considerably increase the yields of the American grape varieties Concord, Campbell Early and Moore Early as compared with own-rooted vines, without affecting the quality of the fruit.

1522. PEYER, E. 634.8-1.521
Die Klonenauslese, ein Mittel zur Verbesserung der Qualität unserer Weine und der Rentabilität des Rebbaues. **(The selection of vine clones as a means of improving the quality of Swiss wines.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 29-33.
A survey of the clones selected from vineyards by the staff of the Wädenswil Research Station and grown on Station ground. The largest number of clones, 42, have been selected from vines of the variety Blauburgunder. A table shows the average performance of these clones in the period 1941-44.

1523. FENNELL, J. L. 634.8: 581.162.3
Timing and production of grape pollen by grafting.
J. Hered., 1945, **36**: 183-5.
The author, working with *Euvitis* varieties, has had considerable success in achieving crosses between varieties which normally blossom at different times. He describes his method. Briefly, he first calculates the length of time which must be expected between grafting and initial growth and between initial growth and flowering of the variety to be used as a source of pollen. Having then provided himself with graftwood of this variety he applies it by the cleft graft method to a suitable stock at such a date as will ensure flower- and hence pollen-production at approximately the date on which the vine to be pollinated will be in flower.

1524. VINET, E. 634.8-1.83
Contribution à l'étude du rôle physiologique du potassium chez la vigne. **(The physiological role of potassium in the vine.)**
Ann. agron. Paris, 1942, **12**: 224-39, bibl. 11.
Thirteen years uninterrupted observations on the vine variety Chenil blanc afford several useful pointers to the role of potassium in vine nutrition. Experimental data show that:—1. Complete manuring—when the vine requires it and only then—results in increased K content in all parts of the vine, especially those on a level with the grapes. 2. This increase in the first years of manuring is greater, the greater the amount of K added to the soil. 3. If the treatment continues for several years the role of the anion becomes noticeable. If KCl is used in large amounts and in non-calcareous soil, it checks the accumulation of K in the plant, whereas the use of the sulphate increases it. 4. Wood growth, fruiting properties and sugar content increase with increased K content. Once the wood has been thus enriched in potash, the shoots, if removed and grafted, retain this characteristic to some small degree, as well as part of the fruiting qualities which they have previously shown. 6. On the other hand K deficiency in the manure tends to result in decreased amounts of this element in the vine. The wood grows, but less than with a complete manure, and production is unfavourably affected. If K is withheld for several years the plant tends to become unthrifty, especially in years of drought. This condition may be attributed to faulty circulation of sap and can be remedied by recourse to purely potassic manuring. The author concludes from this that potassium may be considered a factor in utilizing soil nitrogen, inasmuch as it indirectly favours wood development and the growth of the vine. It also increases sugar content and hence crop production. The use of potash-rich cuttings shows that K influences the effect of the scion on the rootstock. Stocks so grafted show increased root growth and greater power of absorption. Deficiency symptoms show the effect of K on the circulation of the sap. Its addition restores equilibrium and allows of healthy growth, and in this respect it is more important than N and P.

1525. BRANAS, J., BERNON, G., AND LEVADOUX, L. 634.8-1.8
Recherches sur la fumure de la vigne. (II) Sur la remanence des fumures. **(Residual values of fertilizers applied to the vine.)**
Reprinted from *Progr. agric. vitic.*, February and March, 1942, pp. 11, bibl. 2.
A plea based on observations by the head of the viticultural department at Montpellier and others for the application of nitrogenous, potassic and phosphatic fertilizers in larger amounts but less frequently. On average soils it is thought that once in 3 years should suffice for N and K manuring. P takes so long to show effect that it should preferably be applied long before the vines are planted.

1526. WILLIAMS, W. O. 581.111: 634.8-2.19
Grapevine injection apparatus.
Science, 1945, **101**: 416-7, bibl. 5.
A detailed, diagrammatically illustrated account is given of apparatus for injecting solutions into the tracheal system of the xylem of grapevine tissues.

1527. UPSHALL, W. H. 634.8-1.536
Time of year as a factor in transplanting grape vines.
Rep. Vineland hort. Exp. Stat. for 1943 and 1944, 1945, pp. 14-5.
Trials for five years indicate that although Concord vines can be transplanted in the Niagara District in any of the 5 months October to December and in April and May, November and April are preferable, as in October the vines are still in full foliage, in December weather and soil are rarely suitable, while in early May growth is too advanced.

1528. ERLIJMAN, M. 634.8-1.5
Conviene transformar la viña baja en viñedo de espaldera alta. **(The advisability of changing the low training of vines to the high espalier.)**
Rev. B.A.P., 1945, **28**: 330: 18-23.
Advice is given for improving the condition of vineyards in certain parts of the Argentine, particularly the regions of Mendoza and San Rafael. After reference to the attention necessary for irrigation and maintaining good soil conditions the advantages are set out of changing from a low to a high training system, especially in those regions with high atmospheric humidity. High espaliers permit of more light and air, the fruit is higher from the ground and so less liable to fungal infection, cultivation between the rows is easier, the wood ripens earlier, pruning is not only unnecessary but deleterious, and harvesting the crop is more rapidly and economically carried out. The method is briefly described.

1529. KÖNEMANN, E. 634.5
Nussbau in allen Lagen. **(Nut growing under a variety of soil and climatic conditions.)**
Siebeneicher Verlag, Berlin, 1943, pp. 102, RM. 3.20, from review *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 39.
The book, which contains 68 illustrations, includes hazelnuts, walnuts, almonds and chestnuts, and presents data on the significance of each of these kinds of nuts as sources of protein and fat. Pollination and varieties are discussed in detail in addition to all problems relating to propagation and cultivation.

1530. TURNER, H. A. 634.51
Walnuts.
Tasm. J. Agric., 1944, **15**: 55-7.
Walnuts grow freely in Tasmania and bear well in many places, but the nut quality of these seedling trees is largely inferior to that of imported varieties. It is, therefore, suggested that the planting of seedlings be discontinued in favour of planting grafted trees with scions from selected local trees or proved varieties, the quicker way of reworking established trees having been found impracticable, possibly owing to adverse climatic conditions. Tongue grafting and approach grafting are described as alternative methods, which should give good results with seedlings, and suitable varieties are named. In view of spring frosts and bacterial blight, to which early flowering varieties are more susceptible, late flowering varieties are recommended for propagation.

1531. TROFIMOV, T. T. 634.51
The vegetation in walnut forests of southern Kirgizia. [Russian.]
Bull. Soc. Nat. Moscou, 1940, **49**: 155-7.
In this part of the Soviet Union there are 80,000-85,000 ha. of natural forests of *Juglans* spp. which form large associations of *Juglans regia* ssp. *fallax* in the Fergana Massif (32,000 ha.). The bulk of the paper is devoted to the description of plants found in the forests of the *Juglandetum graminosum* type. There are several tables and diagrams showing the distribution of nearly 60 plant species which form luxuriant stands in the shelter of tall walnut trees. Most of the plants consist of the representatives characteristic of the gramineous mesophyte flora of central Russian (Europe) forests: *Brachypodium silvaticum, Millium effusum, Bromus racemosus, Poa nemoralis, Dactylis glomerata, Agropyron drobovii, Festuca gigantea, Melica altissima*, etc.

1532. REED, C. A. 634.521
The beginning of pecan growing as an orchard industry.
Nat. hort. Mag., 1945, **24**: 213-5.
Pecan growing as an orchard industry on a varietal basis dates back to 1846 or 1847, when the first trees of the species were grafted at Oak Alley Plantation, St. James Parish, La. In 1876 this grafted variety was named Centennial.

1533. MCGILLIVRAY, K. D. 634.55-1.542
Pruning the almond.
Agric. Gaz. N.S.W., 1945, **56**: 205-8.
The shaping of young almond trees during the first 4 summers and winters and the pruning of older trees is described. It is the aim of the pruner to develop an open centre. This being achieved, leaders and laterals should be treated generously and the growth habit of the variety taken into account. A brief characterization of the growth habit of 4 varieties is given.

1534. SALA ROQUETA, R. 634.55: 581.162.3
Sobre la polinización del almendro " Desmayo ".
(On the pollination of the Desmayo almond.)
Anal. Esc. Agric. Barcelona, 1941, **1**: 43-56.
95% of the almonds in Spain are of the variety Desmayo de Cataluna or Llargueta. The lack of fruiting in certain plantations suggested that this variety is self-sterile; experimental evidence confirms this, and two varieties, Penal and Serrat, with a flowering period coinciding with that of Desmayo, are recommended as pollinators.

1535.

a FRENCH, A. P. 634.75
Strawberry growing in Massachusetts.
Leafl. Mass. St. Coll. Ext. Serv. **29** (revised), 1945, pp. 19.

b FRITZSCHE, R. 581.162.3: 634.5
Die Blüh- und Befruchtungsverhältnisse der Walnuss und der Haselnuss. **(Flowering and pollination in walnuts and hazels.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 394-7.

c ILIEW, J. 634.54(497.2)
Hazelnuts in Bulgaria. [Bulgarian. German summary.]
Commun. St. Exp. Stat. Fruitgrowing, Drenowo, Bulgaria, **5**, undated, pp. 71, from review *Schweiz. Z. Obst-u. Weinb.*, 1944, **53**: 393-4.

d VAN METER, R. A. 634.711
Raspberry growing in Massachusetts.
Leafl. Mass. St. Coll. Ext. Serv. **48** (revised), 1943, pp. 20.

e VERNER, L. 634.75
Growing strawberries in Idaho.
Bull. Idaho agric. Exp. Stat. **249**, 1942, pp. 14.

PLANT PROTECTION OF DECIDUOUS FRUITS

1536. BROWN, W. 632.3/4
Plant pathology: teaching and research.
Ann. appl. Biol., 1945, **32**: 89-96.
In this, his Presidential Address to the Association of Applied Biologists, Professor Brown concludes with these words, " I feel certain that the greatest requirement is a well-directed concentration upon the problems which the practical grower is prepared to put before the scientific worker. There are many such, and if, as appears to be very likely, there is to be a continued intensification of agriculture in these islands, there will be many more in the future. There is no doubt, therefore, as to the magnitude of the field, and it is a responsibility devolving upon us, as scientific workers, to show that the practical problems of plant cultivation can be solved by the methodical application of the scientific method."

1537. EVANS, J. W. 632.6/7(946)
Applied biology in Tasmania.
Ann. appl. Biol., 1945, **32**: 179-80.
In Tasmania some 300,000 acres are under cultivation and the principal crops are deciduous fruits, hops, potatoes and wheat grown for biscuit flour. Most of the insect pests have been introduced from abroad. One native insect, the light brown apple moth (*Tortrix postvittana* Walk.), has been introduced into England on more than one occasion; it causes surface blemishes on the fruit. After reaching the third instar this pest is difficult to control, for the larvae tend to avoid feeding on poisoned foliage, but larvae in the earlier instars are readily destroyed by lead arsenate sprays. One of the introduced insects that has been abundant in Tasmania because of the lack of parasites is the apple leafhopper (*Typhlocyba froggatti* Baker); it causes a yellowing of apple leaves and speckling of the fruit; at present it is controlled to some extent following the introduction of a Mymarid egg parasite (*Anagrus armatus* Ashm.) from New Zealand.

1538. SMITH, W. P. C. 632.3/4(941)
Some aspects of plant pathology in Western Australia.
J. Aust. Inst. agric. Sci., 1944, **10**: 93-101, bibl. 8.
In his presidential address to the Western Australian Branch of the Institute, read in June 1944, the author discusses the role of the plant pathologist in Western Australia in the past and his present activities and problems. In speaking of future trends he expresses the belief that more attention will be paid to the needs of the home gardener and the nurseryman.

1539. MÜHLOW, J. 632.1/9(485)
Växtskyddsanstaltens filial i Alnarp. (**The Alnarp branch of the Swedish Plant Protection Station.**)
Växtskyddsnotiser, 1945, No. 3, pp. 33-6.
A branch of the Swedish Plant Protection Station was opened at Alnarp in 1939 to serve the needs of the Province of Scania, which is noted for its intensive agriculture, seed growing and fruit growing. A survey of the organization of the Station and its work is given, the latter having been curtailed by the war. Two of the main activities are advisory and estimation of the damage caused to crops in Scania by pests and diseases. In the entomological field pests of oil plants, woolly aphis and trials with DDT have been in the foreground. The work done by the mycological section includes research into a new apple disease* as well as routine tests in collaboration with the main Station.

1540. HURST, H. 632.7: 632.951
Enzyme activity as a factor in insect physiology and toxicology.
Nature, 1945, **156**: 194-8, bibl. 13.
Before any evaluation of insecticidal activity in terms of specific molecular configuration of the insecticide can be made, it is necessary to consider the biophysical and biochemical factors involved. Insecticidal activity is associated with some disturbance in the chain of consecutive vital processes regulating the dynamic balance in internal tissue metabolism. Similarities in biological response to insecticides may merely indicate a coincidence in the chain of metabolic changes induced, although initiated at different points of the chain. The lamellar epicuticle in the living insect acts as a protective water-impermeable barrier. The uptake of fat solvent by the mosaic receptor network of the cuticle increases the volume continuity and permeability of this phase, by displacement of protective lipoid and renders possible the passage of both water-soluble and oil-soluble drugs. It is unlikely that narcosis or death is directly related to primary insecticide-tissue combination. An attempt is made to identify the gross biological responses to an insecticide with specific changes of enzyme activity. The action of narcotics on aerobic and anaerobic components of the respiratory system is discussed. Complex relationships between drug concentration and enzyme activity are interpreted in terms of competition between protective lipoid tissue receptors and enzyme receptors. Thus, in addition to specific cuticle permeability, the relative susceptibility of different insects to the same insecticide will depend on the architecture of the tissue receptors. J.P.R.R.

1541. ANON. 632.9: 634.1/7
Notas varias. (**Various notes.**)
Sugest. oport., Rio Negro, Dec. 1944, 4 pp., Jan. 1945, 4 pp.
Notes on (1) biologic control of the woolly aphis, (2) mosaic of apple foliage, (3) spray damage from mixing lead arsenate and lime-sulphur or applying the arsenate within a few days after spraying with lime-sulphur, (4) root rot of apple trees, (5) a little-leaf disease, (6) control of scale insects, (7) control of codling moth.

1542. ANON. 632.9: 634.1/7
Notas varias. (**Various notes.**)
Sugest. oport., Rio Negro, Aug. 1945, 4 pp., Sept. 1945, 4 pp.
The August number deals with (1) tar-oil winter-washing of fruit trees, stressing the importance of application well before the buds swell, (2) irrigation, with special reference to its use and abuse on crops for green manuring, (3) cutting and impregnating with copper sulphate poplar posts for use as supporting props in the orchard, (4) planting poplars to provide posts, boards, etc., (5) applying fertilizers in spring. The September number consists of brief notes on red spiders, bud mite of pear, green manuring, poplar props, woolly aphis, scale insects, poplars as windbreaks.

* See No. 1575.

1543. KOBEL, F. 581.192: 634.11 + 634.13
Der Junifall. (**June drop in apples and pears.**)
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 223-5.
Five physiological conditions are listed which will cause June drop in apples and pears, four of them characterized by deficiencies: (1) Insufficiency of both carbohydrates and mineral nutrients; (2) insufficiency of carbohydrates in the presence of sufficient mineral nutrients; (3) insufficiency of mineral nutrients in the presence of sufficient carbohydrates; (4) too copious supply of nitrogen; (5) insufficiency of water. It is largely the resistance to irregularities in the physiological balance between the middle of May and the middle of June which makes a variety a reliable bearer. Insufficient pollination may be another cause of June drop.

1544. THOMPSON, S. G., AND ROBERTS, W. O. 634.23-2.19: 581.111
Progress in the diagnosis* and cure of mineral deficiencies in cherries.
A.R. East Malling Res. Stat. for 1944, **A28**, pp. 60-3, bibl. 2.
An account is given of trials for the correction of deficiency diseases in cherry trees in the Sittingbourne area of north Kent. From one experiment it is concluded that a winter (February) spray of, say, 5% manganese sulphate will give a control of chlorosis in the current growing season which is better than that given by a summer spray, but that the effect will not be evident the following year. Multiple deficiencies in cherries are reported where diagnosis by leaf symptoms needed to be supplemented by other diagnostic methods. Leaf analysis suggested deficiencies of iron, manganese and zinc, and this was confirmed by injection experiments. It was shown by solid injection that all three elements were required for a complete cure.

1545. ROBERTS, W. O. 634.1/2-2.19: 581.111
Combined mineral deficiencies in fruit trees.
A.R. East Malling Res. Stat. for 1944, **A28**, pp. 64-7, bibl. 5.
Die-back in apples and pears is widespread in eastern and southern England; 27 cases in apples have been brought to the author's notice from the counties of Norfolk, Suffolk, Essex, Hertfordshire, Kent and Devon, up to the end of 1944. In all of them there was marginal leaf scorch and in the large majority typical symptoms of iron and manganese deficiency. Analyses proved them to be low in potassium, iron and/or manganese. In six boron was low. In most of them iron was low, whereas in the past iron has been found high in amount but in an unavailable form. The potassium deficiency is the result of wartime shortage of potassic manures. The trace element deficiencies result from the naturally calcareous nature of the soils or from calcareous applications and low organic matter. Preliminary experimental injections of the necessary nutrients in solid form have given encouraging indications and more extensive trials are being carried out in the hope of finding a rapid cure, otherwise large numbers of trees are likely to die before slow acting soil applications become effective. [Author's summary.]

1546. ROBERTS, W. O. 632.19: 581.111
Leaf painting as a method of diagnosis of mineral deficiencies.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, p. 67.
The plants tested were a chlorotic hydrangea plant on which ferrous sulphate was used, and peas and a cherry tree deficient in manganese, on which 0·5% manganese sulphate gave successful results. An improvement in colour and general appearance was observed in one or two weeks.

* See also 1383, 1683-9.

1547. THOMPSON, S. G. 581.111: 632.19: 546.72 + 546.711
The cure of deficiencies of iron or manganese.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 119-23.
Curative measures for iron and manganese deficiencies in fruit trees are discussed. Solid injection is recommended when deficiencies are serious, otherwise either summer or possibly winter sprays. The technique for the solid injection of tablets is described in detail; a figure shows the action of the injection gun, and there is a dosage table to give the relation between the circumference of the tree and the requisite number of holes and tablets.

1548. WARD, K. M. 634.1/7-2.19: 546.47
The treatment of little-leaf of deciduous fruit trees.
Qd J. agric. Sci., 1944, **1**: 59-76, bibl. 10.
Little leaf has become increasingly prevalent in the Stanthorpe district, Queensland, notably in apples, but the trouble is also common in pears and stone fruit. It is the object of the paper to present and discuss the experimental data on curative treatments carried out over the period 1937-41. The quickest (within a few months) and most enduring response was obtained by winter applications of a 2·5 or 5% zinc sulphate spray. In order to achieve a complete cure and to prevent reversion to the little-leaf condition it was found necessary to treat affected trees initially in two successive years and thereafter in alternate years. Preferably, the spray should be applied before pruning to avoid a toxic effect on the fresh cuts, or spraying should be delayed for at least a fortnight after pruning. Injections of zinc sulphate solution, applications of spring foliage sprays at 2% and attempts to secure a lasting effect by driving pieces of sheet zinc into the tree trunk or applying zinc sulphate to the soil have failed to give quick or satisfactory results. However, a combination of a 5 lb. zinc sulphate application round an affected tree with winter spraying may prove beneficial in the early treatment of the disorder.

1549. PARTRIDGE, N. L. 634.25-2.19
Influence of trunk injuries on the potash content of fruit tree leaves.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 265-7.
The leaves of peach trees with trunk injuries were observed to show symptoms somewhat similar to those exhibited by potash-deficient trees. Comparative analyses of leaves from injured and healthy trees confirmed the fact that the former had a lower potash content, although the severity of the symptoms was not always related to the degree of potash deficiency. The low potash content in the foliage of an injured tree is, of course, not indicative of a low content of available potash in the soil, but rather of an obstruction in the conductive system.

1550. BLUMER, S. 634.11-2.19: 546.27
Bormangel oder Frostschaden. **(Boron deficiency or frost damage.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 113-6.
The author discusses a paper by H. Anet (*Rev. hort. suisse*, 1944, 17: 249-57) who describes a trouble of apple trees occurring near Berne and in other Swiss districts and attributes its cause to boron deficiency. The symptoms of the trouble appear to be similar to those described by Blumer in a previous article (*Schweiz. Z. Obst-u. Weinb.*, 1944, 53: 245-9; *H.A.*, 14: 1586) and attributed by him to frost injury of the roots. In the case reported by Blumer an enquiry made since publication of the article clearly shows that boron deficiency cannot have been the cause of the death of the trees. The question is asked whether frost injury of the roots, with a resulting serious effect on the health of apple trees, is perhaps a more widely occurring disorder.

1551. MAIER, W. 634.11-2.19: 546.27
Über das Vorkommen einer Bormangelkrankheit der Äpfel in Deutschland. **(The occurrence of a boron deficiency disease of apples in Germany.)**
Phytopath. Z., 1944, **14**: 613-28, bibl. 21.
So far, little attention has been paid in Germany to disorders of apples caused by boron deficiency, but the present investigation proves that the trouble may be severe also on German soils. The symptoms observed by the author under various conditions are described in detail. Diseased fruits suffering from boron deficiency were found to contain 10-25 mg. boron per kg. dry substance as compared with 40-150 mg. in healthy fruits. The introduction of boric acid or borax in solution or in solid form into branches of affected trees prevented the disorder, while untreated control branches showed 76% diseased fruits. Borax manuring was also successful. The possibility that trees under sod may benefit from the accumulation of boron by the grass roots is discussed but has as yet not been proved.—Viticultural and Horticultural Research Station, Geisenheim on Rhine.

1552. BLUMER, S. 634.11-2.19: 546.27
Absterbeerscheinungen an Apfelbäumen. **(Die-back of apple trees.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 184-5.
In support of his article on boron deficiency or frost damage, *ibidem*, 1945, 54: 113-6; *H.A.*, 15: 1550, the author reproduces the photograph of an apple tree with serious symptoms of die-back, similar to those associated with boron deficiency, although lack of boron must be excluded as source of the trouble. In some trees the die-back is more severe on one side than on the other, indicating a one-sided root damage, caused by frost or cockchafer larvae, with which this particular orchard is infested.

1553. NICHOLAS, D. J. D., AND JONES, J. O. 632.19: 581.192
The application of rapid chemical tests to plant tissues in the diagnosis of deficiencies of mineral nutrients. Progress report 1.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 84-97, bibl. 7.
During 1944 chemical tissue tests were carried out on fresh leaf materials of a number of fruit and vegetable species from known manurial plots and known nutrient treatments. Results indicate the value of the method for diagnostic purposes, though further work is necessary to fix standards for various plants. Sampling methods and preparations of test samples are described. Details are given of the extraction of kations and anions from plant petioles by Morgan's Reagent or HCl. Tables are given of tissue test results which indicate correlation with manurial treatment, visual data and full chemical analysis.

1554. BRUNT, D. 632.111
Some factors in micro-climatology.
Quart. J. roy. met. Soc., 1945, **71**: 1-10, bibl. 19.
Although less than one-third of this most readable presidential address, delivered before the Royal Meteorological Society in January 1945, is devoted to the incidence of frost, this third is full of valuable information for horticulturists. We are indebted to the author for the following definition of *katabatic winds and minimum temperatures*.
"When, on a clear quiet night, the ground is cooled by radiation to the sky, the air in immediate contact with the ground is rapidly cooled. Over the surface of sloping ground the cold air flows downward, behaving in much the same way as water would, following any course hollowed in the slope, and filling the low ground with a pool of cold air. If the low ground is in the form of a hollow, from which the cold air cannot flow away, much lower temperatures will occur there than over flat ground in the same region.

" The full development of katabatic winds requires a clear sky and a calm or very light wind. In these conditions the air temperature falls to lower values over low ground than over high ground. When the wind remains brisk all night, the surface cooling is lessened, and katabatic winds do not develop, or fail to attain their full strength. In these conditions, the minimum temperature at the end of the night is lower on the high than on the low ground, the greatest difference which can occur between the minima over high and low ground corresponding to the dry adiabatic lapse rate of 5·4° F. per 1,000 feet of difference of level.

" Among fairly high hills, the katabatic wind is developed only over the lower slopes, while the normal daytime wind persists over the higher ground, with a zone of calm at the intermediate level." Temperature records made at Rickmansworth, Herts, and elsewhere during the night of 28-29 March 1933, provide a striking illustration of the occurrence of low minimum temperatures in an enclosed hollow. While Croydon, which is on the flat, registered 65° and 35° F. as maximum and minimum respectively on the 28th and 29th, Rickmansworth showed a range of 45·5° F. with a maximum and minimum at 66·9° and 21·4° F. respectively. Some observations made during the same year in a valley below Leafield in Oxfordshire indicate that at times the temperature in the valley fell 10° F. below that on the adjacent high ground. The illusion of the sheltered valley as a desirable site for home or orchard is being destroyed by temperature records. Low night temperatures, accompanied by frequent frost and fog, favour, as the author says, " neither man nor apple tree ". At Rickmansworth, for instance, ground frost may be expected on at least one or two nights in any given month and, taken over the whole year, one night in two will show ground frost; moreover, in 1935 morning fogs occurred on 50 mornings, as compared with 9 mornings at Rothamsted, not many miles away, but on open high ground.

Speaking of the nature of the soil or soil covering in connexion with the rapid cooling of the ground, which produces katabatic winds, Professor Brunt states: " Apart from snow, a covering of long grass favours the most rapid cooling of the ground, and where the upper part of a slope is covered with long grass, strong katabatic winds will be liable to flow down the slope on clear nights. It should perhaps be pointed out that, while katabatic winds are normally regarded as night phenomena, they may occur by day on northern slopes which are shaded from sunshine." Whereas in flat country and in the absence of winds orchard heaters may compensate for the heat lost by radiation, they will afford no protection where there is a steady katabatic flow of cold air down a slope or a constant inflow of very cold air into a hollow. In these circumstances also the covering of plants by screens must be ineffective. " Perhaps ", the author goes on, " more could be done to deflect katabatic winds than has yet been attempted. A thick hedge running diagonally across a slope would deflect the katabatic wind, and to some extent canalize it, so affording protection to the area below the hedge. A wall or hedge running horizontally across the slope would not afford any adequate protection, since the cold air would accumulate behind the barrier, and finally overflow it in a cascade. It is particularly important to avoid damming cold air within an orchard, by a hedge or wall at its lower boundary. Where an orchard is subject to katabatic winds, every effort should be made to let the cold air flow out of the orchard as freely as possible." On the other hand, it should be considered that the damage of wind frosts is greater on high than on low ground and that further investigation of the protection afforded by windbreaks is required.

Other chapters of special interest to the agriculturist deal with *The effect of the nature of the soil* [on the microclimate], *The effect of lack of soil drainage*, *The effect of soil covering* and *The effect of aspect on soil temperature*. In the final paragraph on *The presentation of micro-climatological data* it is pointed out to meteorologists that agriculture requires more information relating to the extremes of temperature and to the distribution of rainfall in time rather than to mean temperatures and total rainfall.

1555. DAVISON, J. R. 634.1/8-2.111-1.4
The effect of soil condition on damage caused by spring frosts in parts of the Murrumbidgee Irrigation Area.
Agric. Gaz. N.S.W., 1945, **56**: 243-5.

Observations have shown the influence of soil condition on the damage caused by spring frosts in the Murrumbidgee Irrigation Area to be as follows:—1. The degree of frost damage is increased where the orchard is in a state of dry tilth. 2. It is least where the soil is moist and undisturbed. 3. The presence of irrigation water at blossom-set increases humidity, and reduces the danger of frost damage. These observations suggest a course of action which could be followed after a dry winter. Briefly, this is:—1. Irrigate late in August; 2. lightly irrigate at bud-burst; 3. leave the soil undisturbed until the fruit is well set and the danger of frost is past. [From author's summary.]

1556. S.Z.O. 634.1/7-2.111-2.95
Soll die Schädlingsbekämpfung im Obstbau trotz den Frostschäden nach dem Spritzplan fortgesetzt werden ? **(Is it advisable to continue the spraying of fruit trees according to schedule in spite of frost damage ?)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 198-9.

Wide fruit growing areas in Switzerland were afflicted with a blossom frost in the spring of 1945. The following advice as to the continuation of spraying is given: (1) Continue to spray trees on which some fruits per branch have set. (2) Valuable scab-susceptible varieties, such as Gravenstein and Boskoop, should in any case receive the first post-blossom application to ensure healthy foliage and thus next year's crop. (3) Discontinue spraying all other trees which do not show any fruit set. Two excellent photographs of an uninjured apple blossom and of an apple blossom with blackened styles and stigmata are reproduced.

1557. PEYER, E. 634.8-2.111
Frostschäden und die Behandlung der frostgeschädigten Reben. **(Frost injuries and the treatment of frost-injured vines.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 185-6.

A survey of the extent of the heavy damage caused to Swiss vineyards by a frost during the night of 30 April to 1 May 1945. Suggestions are made for the treatment of injured vines.

1558. WÄCKERLIN, O. 634.8-2.111
Erfahrungen im Frostschutz bei Reben im Frühjahr 1945. **(The lesson learned in the frost protection of vines in spring 1945.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 397-9.

Specified calculations show that in Swiss vineyards the protective covering of vines in the spring as a routine measure remains profitable, if a 50% frost damage occurs only once during a 10-year period. Observations after the destructive frost of 30 April-1 May, 1945, indicate that even a temperature of – 6° C. did not injure vines under straw cover, provided the cover had been applied in time. The effect of covering the vines on the evening of 30 April, when the temperature had already sunk to 1-2° C., was practically nil.

1559. SCHELLENBERG, A. 634.8-2.111
Frostschaden und Frostschutz im Weinbau. **(Frost damage and frost protection in viticulture.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 374-82.

Observations made in the canton of Zürich during the spring frosts of 1945. The vineyards of the area are divided into 3 classes according to their liability to spring frosts: (1) Pronounced frost sites, (2) sites with intermediate

danger of frost and (3) sites with little danger of frost. Whereas on sites of category (1) protective measures should be taken in any case, owners of category (2) sites should have everything ready and follow the weather report. For sites of the third category the purchase of anti-frost devices is uneconomical; instead, the introduction of a frost insurance is suggested, which could be largely based on existing calculations. A comparison of different materials used for covering vines tends to show that straw covers have given the best results. In one trial excellent protection was also obtained with jute sacking. The significance of the cover is not confined to its preservation of the shoots, but extends to the saving of buds in the old wood, which in the case of straw-covered vines were found to give rise to the heaviest and best-matured grapes. It is calculated that protected plants yielded 0·3 litre of wine more per vine than uncovered plants.

1560. PEYER, E. 634.8-2.111
Ein praktischer Strohfrostschirm. **(Frost protection of vines by a new type of straw cover.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 280-1.

According to the author, the problem of frost protection of vines has been solved by a strikingly simple device, for which a patent has been taken out. A cover of straw fastened to two wires, which opens like a book and is attached to the pole without tying. The cover clings to the pole and will neither damage the young shoots by falling on them or by being moved in the wind. The device is illustrated.

1561. BEAKBANE, A. B., AND THOMPSON, E. C. 634.11-2.1
Abnormal lignification in the wood of some apple trees.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 36-7, bibl. 4; and
Recognition of "rubbery" condition in Lord Lambourne and some other apple varieties.
ibid., pp. 108-9, bibl. 2.

The condition known as rubbery wood, particularly associated with the apple variety Lord Lambourne, but seen also in other varieties, is shown to be associated with a lack of lignification in many of the xylem fibres and vessels. This lack of lignification can be seen by the naked eye when a cross-section of the wood from a living branch is stained with a 0·5% solution of phloroglucinol in concentrated hydrochloric acid; the pale unstained areas of unlignified tissue contrast with the red-stained normal wood.

1562. KRONENBERG, H. G. 634.75-2.8
Kort verslag van het onderzoek naar de aardbeienziekten in Kennemerland. **(A short account of investigations on strawberry diseases in Kennemerland.)**
Reprinted from *Meded. Inspect. Tuinb. Tuinbouwonderw.*, Jan. 1944, pp. 26-40.

In recent years strawberries in Kennemerland have suffered severe losses from animal pests and fungous parasites, and from virus diseases. In some years there have been heavy infestations of the strawberry mite, *Tarsonemus pallidus* Banks; trials to free the plants from mites were made with the warm water treatment and with methyl bromide (S-gas); the former caused too much damage for general recommendation, but good results were obtained with methyl bromide. The larvae of the vine weevil *Otiorrhynchus sulcatus* L. and the nettle weevil *Phyllobius urticae* de Geer caused much damage by gnawing the roots and rhizomes; the former is difficult to control, the latter can be checked by derris and Gesarol and to a less degree by pyrethrum. Cockchafer grubs, presumably of *Serica brunnea* L., caused damage in certain areas. The blossom weevil, *Anthonomus rubi* Herbst, destroyed a considerable portion of the crop by removing the blossom buds; a late blossoming variety of strawberry (Frau Mieze Schindler), bearing female flowers only was very slightly attacked. In laboratory tests the weevil proved to be very sensitive to pyrethrum and Gesarol, less so to derris, in the field no satisfactory control was obtained. The fungous diseases seen were: mildew, *Sphaerotheca humuli* Burr., which was checked by preparation Sebo 55; leaf spots caused by *Mycosphaerella fragariae* Lindau and *Fabraea fragariae* Kleb., and another, not identified, that showed some resemblance to leaf scorch (*Mollisia earliana* Sacc.); and a root rot, occasionally met with but not studied further. Various strains of strawberry were tested for virus infection by the grafting method using *Fragaria vesca* as indicator plant, and the crinkle virus was proved to be present. A disease known as "Canker" is described; the cause is not stated but infection was shown to come from the soil.

1563. KRONENBERG, H. G. 634.75-2.8
Virusziekten in aardbeien. **(Virus diseases in strawberries.)**
Reprinted from *Tijdschr. PlZiekt.*, Maart-April 1943, pp. 74-6.

In this paper presented at a meeting of the Netherlands Plant Pathologists on 28 November, 1942, the author gives a general account of xanthosis or yellow-edge, crinkle and witch's broom of strawberries. Symptoms typical of all three have been seen on strawberries in Holland. In inoculation tests, using Harris's grafting method, with the wild *Fragaria vesca* as indicator plant, it has been shown that the virus of crinkle is present in varieties commonly grown in Holland, e.g. Jucunda, Oberschlesien and Frau Mieze Schindler.

1564. BEAUMONT, A., AND STANILAND, L. N. 634.75-2.8
On the spread of crinkle in Royal Sovereign strawberries in south-west England.
Ann. appl. Biol., 1945, **32**: 123-7.

In south Devon the maximum appearance of crinkle symptoms occurs in June and July, when roguing and inspections should be completed. The data suggest that infection in summer by apterous aphides passing on to neighbouring plants is probably the chief cause of spread.

1565. JOHNSTON, S., CATION, D., AND BOYER, C. A. 634.73-2.8
Blueberry stunt disease.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **27**: 409-12.

A brief description of the symptoms of blueberry stunt virus and a discussion of the regulations, recently introduced in Michigan, concerning the compulsory inspection of blueberry plants to be propagated for sale. A voluntary inspection service for blueberry cultures was established in 1944.

1566. RIVERA, V. 632.3/4+632.8
Malattie delle piante. **(Plant diseases. Vol. I.)**
Amatrice (Rieti), 1942, pp. 270, from review *Phytopath. Z.*, 1943, **14**: 524.

Following an introduction of a more general character the virus and bacterial diseases of plants are dealt with in this first volume. The reviewer, Professor E. Gäumann, praises in particular the classification of bacterioses which is in broad agreement with medical conceptions. The book contains 112 illustrations on 33 plates.

1567. DRUMMOND, O. A. 632.3/7+632.95
As doenças e pragas das plantas e a importância do seu conhecimento e combate. **(Pests and diseases, their recognition and control.)**
Ceres, 1944, **6**: 3-15, bibl. 39.

This is a general account of plant diseases, the conditions under which they become severe, their distribution by seed and seedlings, precautions to be taken, and control measures.

1568. WORMALD, H., AND GARNER, R. J. 634.11-1.541.11: 632.314
An experiment on the control of crown gall on vegetatively-raised apple rootstocks.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 73-4, bibl. 8.

The root systems of apple rootstocks were immersed, just before planting, in a mixture of soil, Uspulun (at ½% and ¼%) and water, forming a paste or "slurry". The treatment not only gave some control of crown gall but resulted in better rooting and consequently a better stand of the young trees.

1569. BROWN, J. G., AND BOYLE, A. M. 632.314: 633.88
Application of penicillin to crown gall.
Phytopathology, 1945, **35**: 521-4.

Crude penicillin injected hypodermically into *Bryophyllum* galls, induced by inoculation with a pure culture of *Agrobacterium* (*Phytomonas*) *tumefaciens*, checked the growth of the galls, which however were not killed by one treatment by injection, although the resulting necrosis was extensive in some cases. Galls wrapped with cotton wool soaked in crude penicillin showed retarded growth and browning of the elevations on the surface of the galls. Numerous punctures of the galls, made by thrusting a sterile needle through the cotton wrapping, were soon followed by the death of the galls. Controls were unaffected.

1570. REID, W. D. 632.314: 634.22 + 634.25
Bacterial-spot of plum and peach.
N.Z. J. Sci. Tech., 1945, **26**, Sec. A, pp. 359-66, bibl. 9.

Since 1941 bacterial-spot of plum, caused by *Xanthomonas pruni*, has been widespread in New Zealand where, in contrast to the United States, the disease is less severe on peaches. In a preliminary inoculation trial carried out with 40 plum varieties, all of which proved susceptible, the English varieties showed a high degree of resistance. The symptoms consisting of leaf-spotting, easily confused with shot-hole, small dark-brown lesions on the fruits and raised rough lesions on the branches, are described and pictured. Of the treatments tested, spraying with 1½-3-50 bordeaux mixture caused the greatest reduction in infection and the least foliage damage in the Doris and George Wilson varieties used in the trial. Zinc sulphate sprays, which also controlled the disease, were found to injure the foliage to such an extent as to be of no practical value. Dressings of nitrate of soda and severe winter pruning, elsewhere suggested as possible cures, failed to reduce bacterial spot; such pruning was even found to increase infection. It is suggested that new growth may be protected from infection by summer pruning diseased twigs or by additional bordeaux applications in the autumn.

1571. ERIKSON, D. 634.22-2.314
Certain aspects of resistance of plum trees to bacterial canker Part I. Some biochemical characteristics of *Pseudomonas mors-prunorum* Wormald and related phytopathogenic bacteria.
Ann. appl. Biol., 1945, **32**: 44-52.
Part II. On the nature of the bacterial invasion of Prunus sp. by *Pseudomonas mors-prunorum* Wormald.
ibid., pp. 112-7.
ERIKSON, D., AND MONTGOMERY, H. B. S.
Part III. The action of cell-free filtrates of *Pseudomonas mors-prunorum* Wormald and related phytopathogenic bacteria on plum trees.
ibid., pp. 117-23.

This series of papers describes the work undertaken at East Malling and at University College Hospital Medical School, London, with the object of explaining certain physiological aspects of the host-parasite relationship in the bacterial canker disease of plum and cherry trees, particularly with regard to the difference in resistance and susceptibility shown by different varieties of plums. Part I deals with a biochemical study of the reactions, in certain culture media, of the causal organism and other related bacteria; these organisms were cultivated on media with a wide range of carbon and nitrogen sources. The conclusion drawn was, that on the basis of biochemical characteristics, considered apart from host pathenogenicity, there is no justification for erecting to specific rank these various levan-forming green-fluorescent, phytopathogenic pseudomonads. In Part II is a histological study of the necrotic areas in the stems of a resistant and of a susceptible variety of plum when inoculated with the causal organism at different seasons of the year. The pathogen was found to penetrate between the cells, causing disintegration of the tissues, but not invading the cells until they were isolated and plasmolyzed. The difference in injury to the tissues of the two varieties was quantitative rather than qualitative. Lesions were obtained not only by inoculations with suspensions of *P. mors-prunorum* but also with cell-free filtrates of the organism. In Part III the technique is given of preparing bark extracts for culture media, and of injecting cell-free filtrates into plum stems. Extracts from bark of either the resistant or the susceptible variety supported growth so that it would appear that resistance is not due to specific chemicals in the bark. A susceptible variety of plum (Giant Prune) showed greater injury by cell-free filtrate of the organism than did a resistant variety (Warwickshire Drooper) which showed negligible injury. Evidence is given for the view that the deleterious activity of *P. mors-prunorum* may be due in part to an endotoxin of protein nature, obtainable from the dried bacterial cells by acetic acid extraction, and the opinion is expressed that resistance may be due to a host reaction delimiting the spread of the bacteria or toxin.

1572. REID, W. D., AND BRIEN, R. M. 588.427: 632.3
Control of grease-spot of passion vine.
N.Z. J. Sci. Tech., 1945, **27**, Sec. A, pp. 1-3.

Following the discovery of the causal organism, *Phytomonas passiflorae*, by the senior author, a spray schedule against grease-spot of passion-vine was determined in further experiments during 1942-44. The following recommendations are given for the control of the disease, which has caused serious losses in vines and marketable fruit and in some areas of New Zealand has necessitated the eradication of extensive plantings: "(1) Prune vines after crop is harvested in order to facilitate spraying. Complete spray coverage is essential. (2) Spray vines with bordeaux mixture, 3-4-50, immediately after pruning. (3) Maintain cover of bordeaux mixture, 3-4-50, from mid-March to mid-August. At least four applications at approximately monthly intervals are required."

1573. GARRETT, S. D. 632.4: 581.144.2
The root-infecting fungi.
Endeavour, 1945, **4**: 104-7.

For a review of the author's recently published book with a similar title see *H.A.*, 15: 915. In this article the subject is dealt with only briefly in a general manner. The belief is expressed that the control of root diseases of tropical plantation crops will be greatly facilitated in future, since R. Leach's discovery in Nyasaland of jungle roots as the source of infection. Control measures consist of killing jungle trees a year before felling by ring-barking—in which case the roots are entered by saprophytic fungi and not by parasites—or, as was subsequently found in Malaya, by the injection of certain plant poisons.

1574. OSTERWALDER, A. 634.13-2.4
Von der Herbstfärbung und Degeneration der Theilersbirnbäume. **(Autumn colouration and degeneration of the Theilers pear.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 450-4.

The so-called degeneration and premature autumn coloration in Switzerland of the perry variety of pear known as

Theilersbirne are chiefly due to scab and can be remedied by spraying with copper sulphate spray. Unbalanced nitrogen applications may be a contributory cause.

1575. Björling, K. 634.11-2.4
En för Sverige ny äpplesjukdom. **(First record of a new apple disease in Sweden.)**
Växtskyddsnotiser, 1945, No. 3, pp. 45-8.
A preliminary note on a disease observed in Sweden for the first time in spring 1944 in some thirty 5- 6-year-old apple trees in Åkarp, belonging to different varieties. Symptoms consisted chiefly of drying out of fruit buds and dying back of fruit spurs and occasionally of canker-like wounds further down the affected branch. In autumn 1944 the Åkarp branch of the Plant Protection Station received some apples of the Cox's Orange type from Scania, showing clearly defined black spots of 1·5-3 cm. diameter. Culture experiments revealed that both infections were due to the same fungus, one stage of which was described by G. A. Newton in 1925 as *Pleospora mali*, the other as *Stemphylium congestum*. In fruit inoculation trials it was found that Bramley, Sweet McIntosh and Lane's Prince Albert were very susceptible to the disease, whereas Newton Pippin and Schurapfel proved relatively resistant.

1576. Kemp, H. K., and Beare, J. A. 634.11-2.42
Black spot of apple.
J. Dep. Agric. S. Aust., 1945, **48**: 374-80, bibl. 1.
The apple scab fungus, *Venturia inaequalis*, causes considerable losses in the cooler, wetter parts of the Adelaide Hills, where most of the apple orchards are situated. Investigations show that in this area the period of ascospore discharge extends approximately from late August to mid October. As a result of spray trials, which have been carried out since 1936-7, the following schedule is recommended for most districts and most varieties: At the green tip stage: 6-4-40 bordeaux mixture; at the pink stage, just before the blossoms open: lime-sulphur 1 gal. to 40 gal. water; at petal fall: lime-sulphur 1 gal. to 60 or 80 gal. water. The following additional directives are given (1) for wet districts: apply 2 bordeaux sprays, at early green tip and at closed to open cluster stage, and include 1% lime-sulphur in the first cover spray 2 weeks after petal fall in the case of a wet spring; (2) for late flowering varieties such as Rome Beauty: apply 2 bordeaux sprays, the first at the first movements of the leaf buds.

1577. Marsh, R. W., and Dickinson, D. 634.723-2.42
The control of black currant leaf spot by dithiocarbamate sprays and the effects of spray residues on the canned fruit.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 150-7, bibl. 7.
In the past the normal routine control of *Pseudopeziza ribis* has been a bordeaux spray immediately after picking, the use before picking of any copper spray being undesirable owing to copper residues in processed currants. In a recent trial on Baldwin currants at Long Ashton leaf spot was satisfactorily controlled by spraying, 15 days before picking, with a ferric dimethyldithiocarbamate preparation, the level of control being slightly raised by a supplementary post-crop application of bordeaux, or copper sebacate. Post-crop treatments alone—effective in the order bordeaux, copper sebacate dust—were generally inferior in the control achieved. Neither staining of the can nor discoloration of the contents resulted from the use of the dithiocarbamate on bushes, the currants from which were later canned. Further tests showed that its use did not accelerate the corrosion of steel plate by black currant juice. Although preliminary trials indicate that this substance has some effect in promoting breakdown of vitamin C and in interfering with its estimation, the extent to which this occurs would not appear to be important.

1578. Minkevicius, A. 632.452
Beitrag zur Verbreitung, wirtschaftlichen Bedeutung und zur Frage der Überwinterung von *Cronartium ribicola* Dietrich in Litauen. **(Distribution, economic significance and hibernation of *Cronartium ribicola* in Lithuania.)**
Phytopath. Z., 1945, **14**: 604-12, bibl. 11.
The only effective control measure against *Cronartium ribicola* (currant rust) would be the discontinuation of Weymouth pine cultivation until rust resistant varieties of the pine have been developed.

1579. Jenkins, A. E., Forsell, M. J., and Boyle, L. W. 632.4: 634.11 +634.13
***Elsinoë piri* discovered on apple and pear in Western Washington and Oregon.**
Abstract in *Phytopathology*, 1945, **35**: 486.
A leaf and fruit spotting of apple and pear, caused by *Elsinoë piri* in its conidial (*Sphaceloma*) stage, has been found in western Washington and western Oregon. At present the disease appears to be confined to the moist sections in those States; it is not known to occur in commercial apple-growing areas and has been found only in home orchards. Late yellow varieties of apple and seedlings with light-coloured fruit appear to be particularly susceptible. As many as 100 spots, up to 2 mm. in diameter, have been counted on a single small fruit.

1580. Fresa, R. 632.4: 634.2
"Podredumbre morena" de los durazneros y ciruelos en el delta del Paraná. **(Brown rot of peaches and plums in the Paraná delta.)**
Rev. argent. Agron., 1945, **12**: 22-5.
Brown rot is a serious disease of peaches and plums in the delta of the Paraná, Argentina, chiefly as a rotting of the fruit, but also occasionally on the peach as a blossom wilt. In years of severe attacks as much as 60% of the crop may be destroyed. No apothecia were found but the fungus was identified, by cultural methods, as *Sclerotinia fructicola* (Wint.) Rehm.

1581. Lüthi, E. 634.23-2.4
Ergebnis der Versuche zur Bekämpfung der *Gloeosporium*-Fruchtfäule an den Kirschen 1944. **(1944-results in the control of *Gloeosporium* rot of cherries in Switzerland.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 177-84.
Symptoms and significance of the *Gloeosporium* disease of cherries in certain parts of Switzerland were described *ibidem*, 1944, 53: 145-51, 161-9; *H.A.*, 14: 1145. The following spray schedule, worked out in 1944 by the Thurgauische Zentralstelle für Obstbau in conjunction with the Wädenswil Research Station, was found to give a very satisfactory degree of control: First post-blossom spray at petal fall with a 1% lime-sulphur mixture + ·1% iron vitriol. Second post-blossom spray with 1% Amarex (99·7% control) or ·5% copper oxychloride + ·2% of a wetting agent (97·7-99·5% control) 8-10 days later (at time of fruit drop). Third post-blossom spray 10-14 days later with one of the chemicals used in the second application.

1582. Lewis, F. H., and Groves, A. B. 634.23-2.952
Spraying sour cherries for disease affects size and quality of fruit.
Supplement 3 to *Bull.* **464**, *The 57th A.R. Pa agric. exp. Stat.*, pp. 6-7.
We have here further notes on the work initially reported in *Bull. Pa agric. Exp. Stat.* 447; *H.A.*, 14: 614. Spraying sour cherries with bordeaux and with lime-sulphur resulted in poor quality fruit. Insoluble and proprietary coppers produced effects rather similar to those of bordeaux. Compound 341 proved the best organic fungicide, but even so after its use, the cherries were abnormally light in colour and had low solids content. Fermate and dithane were for various reasons unsatisfactory. Compound 604, Puratized

N5-X, Isothan Q4 and Isothan Q5 had no marked effects on the fruit and gave good leaf spot control till late in the season. Further work with them and other organic fungicides should eventually result in substances which will control disease without dwarfing or otherwise harming the fruit or causing premature leaf fall.

1583. BREMOND, E. 634.8-2.952.1
Le sulfitage des vendanges par le gaz sulfureux provenant de la combustion du soufre. **(Sulphuring vines.)**
Bull. Inspect. gén. Agric. algér. **91,** 1943, pp. 4.
The shortage of liquified SO_2 in Algeria has forced growers to fumigate their vineyards according to the ancient method of burning sulphur, suggestions for the improvement of which are here made.

1584. BRANAS, J. 634.8-2.411
La lutte contre le mildiou par des mesures prophylactiques. **(The control of downy mildew of the vine by prophylactic methods.)**
Reprinted from *Progr. agric. vitic.*, 1942, 11 pp.
The destruction of all the winter spores of the fungus is impracticable, but much can be done by sanitary measures to prevent the formation of centres of infection. Thus at the time of the spring cultivation care should be taken to keep ditches cleared and rain water carried off. Water shoots should be suppressed. Old, abandoned vines should be destroyed and not merely left to spread infection

1585. BRANAS, J., BERNON, G., AND BELLET, H. 634.8-2.411
Toxicité des électrolytes a l'égard du mildiou de la vigne. **(Toxicity of electrolytes to vine mildew.)**
Reprinted from *Progr. agric. vitic.*, 9-16, août 1942, Nos. 32/33, 7 pp.
The authors discuss the toxicity of different electrolytes and the role of the anions and of the cations. They conclude that generally speaking the toxicity of metals to vine mildew (*Plasmopara viticola*) is related to their chemical structure. In point of fact no common metals are so toxic as copper. Moreover classing metals according to their toxicity probably does not correspond with their practical value in this respect, since this depends not only on toxicity but also on their solubility in rain water.

1586. FREZAL, —. 632.421.1: 634.8
Comment réduire les exigences en soufre de la lutte contre l'oïdium. **(How to economize in sulphur in the treatment of *Oidium.)***
Bull. Inspect. gén. Agric. algér. **114,** 1945, pp. 12.
As the result of the interruption of sulphuring during the war years *Oidium* has become a serious disease in Algerian vineyards. With sulphur in short supply the adoption of a treatment economizing in sulphur is essential. That such an economy may be achieved by the use of polysulphides and wettable sulphur has been shown by a trial conducted on a severely infested vineyard of 10 hectares, following a series of preliminary trials in different parts of the country. The treatment recommended consists of 2 applications of polysulphides, at bud burst and at the differentiation of the clusters, and of 3 applications of wettable sulphur at flowering, at 3 and at 6-7 weeks after flowering. The success was at least equal to that obtained with 5 applications of sulphur dust and the saving amounted to 65%, 50 kg. instead of 150 kg. per hectare having been used.

1587. BRANAS, J., AND BERNON, G. 634.8-2.421.1-2.952.1
Essais de soufres et de produits soufrés à l'école nationale d'agriculture de Montpellier. **(Tests of sulphur and sulphur products [against vine oidium] at Montpellier.)**
Ann. Épiphyt., 1943, **9**: 83-129.
Observations and trials of the action of different sulphurs and sulphur products in the vineyard show that pure sulphur, sublimated or triturated, is preferable to all other products so far available. So-called wettable sulphurs have certain advantages but must be used with caution.

1588. MESTRE, C., AND MESTRES, A. 634.8-2.4
Contribución al estudio de fórmulas utilizables en la lucha contra él mildiu, a base de dosis reducidas de cobre. **(A contribution to the study of formulae used in the control of mildew, based on a reduction of the copper content.)**
Bol. Inst. nac. Invest. agron., Madrid, 1943, No. 9, pp. 41-128, bibl. 115.
The scarcity of copper during the war years led the authors to study the copper-containing spray fluids with the object of ascertaining whether the amount of copper could be reduced without a loss in efficiency, with special reference to the control of the vine downy mildew, *Plasmopara viticola*. The work consisted of (1) laboratory studies of bordeaux mixtures prepared according to various formulae, their rate of sedimentation, their wetting properties, adherence, etc., and (2) a discussion of the results of the experiments. These results showed the possibility of satisfactorily reducing the amount of copper present in sprays of the generally accepted formulae, and the following is recommended: 1 kg. sulphate of copper, 1 kg. sulphate of iron, 100 litres water, and sufficient lime to make the spray fluid slightly alkaline.

1589. LEVADOUX, L. 634.8-2.42
Le brenner (*Pseudopeziza tracheiphila* Mull. Thurg.). **(The "rote brenner" of the vine.)**
Reprinted from *Bull. Off. internat. Vin,* Dec. 1944, 12 pp., bibl. 17.
Outside France, where it is not generally serious, the rote brenner has been found in Switzerland, Germany, Central Europe and Southern Russia. In France it appears in late May or early June on the leaves at the base of the current year's shoots as spots which spread and later become red or reddish brown giving rise to the phenomena variously known as Rouget, Rougeau, Rougin, Brûlon, Brand, etc., which are partly due to the fungus and partly due to secondary infections or nutritional causes. It can be controlled adequately by various sulphur treatments, but the proper time at which to apply these needs more clear definition.

1590. HEUSSI, G. 634.8-2.4
Erneute Rotbrennerschäden im Jahre 1944 in den Reben der Bündner Herrschaft. **(More "rote brenner" *(Pseudopeziza tracheiphila)* damage in Swiss vineyards in 1944.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 100-4.
The Bündner Herrschaft, Switzerland, experienced a new severe outbreak of the rote brenner disease of vines in 1944, for the development of which the exceptional preceding drought and the lack of stable manure had created very favourable conditions. The close relation of soil moisture to susceptibility was made evident by comparing the incidence in different localities. A further proof of the importance of the water balance in disease resistance was provided by the fact that the very susceptible variety Burgunder suffered more severely on its own roots than on American rootstocks, which have a more vigorous root system. As a result of comparative trials the following treatment is recommended for the protection of the vines: Apply 1·5-2% bordeaux mixture when the young shoots are 12-15 cm. long and the lowest leaves have a diameter of 4-5 cm. If the growing conditions are good, spray again 6-8 days later with 2% bordeaux (probably coinciding with the first spray against *Peronospora*). The concentration of further applications, the dates of which will be determined by the *Peronospora* spray schedule, may be reduced to 1·25-1%.—Plantahof.

1591. BRANAS, J. 634.8-2.411-2.952.2
Recherches sur les oxychlorures de cuivre et leur emploi en viticulture. **(Oxychlorides of copper and their use in viticulture.)**
Reprinted from *Bull. Off. internat. Vin*, Mai-Juin, 1942, 10 pp.
Field experiments showed the marked inferiority of oxychlorides of copper as a control for vine downy mildew to ordinary bordeaux, when these substances are applied at doses corresponding to equal quantities of copper. To get the same results it is necessary to use very much more concentrated suspensions of the oxychlorides, thus expending more copper. It must be remembered, however, that whereas bordeaux needs sulphuric acid, none is used for the oxychloride suspension.

1592. BENLLOCH, M. 634.63-2.4
La "quema" o "socarrina" de las hojas del olivo producida por *Stictis panizzei*, De Not., en España. **(Burn and scorch of olive leaves caused by *Stictis panizzei* De Not., in Spain.)**
Bol. Inst. nac. Invest. agron., Madrid, 1944, No. 10, pp. 309-18.
A leaf scorch of olives in the province of Cordova, Spain, occurs as reddish blotches, mostly at the tips or along the edges of the leaves. On these blotches the fructifications of the fungus *Stictis panizzei* appear as dark dots. The disease affects only the old leaves. Infection is favoured by high temperatures and the humid atmosphere and rains of autumn. Some varieties of olive are found to be more susceptible than others to this disease. Two other fungi, *Macrophoma oleae* and *Septoria oleae*, have occasionally been found on affected leaves. The article is illustrated with 10 figures from photographs and one coloured plate.

1593. VITORIA, E. R., AND CERESA, M. C. D. 634.8-2.4
Eficacia de los tratamientos "antiperonospóricos" a base de sales de cobre en la provincia de Mendoza. **(The effectiveness of antiperonosporic preparations containing copper salts, in the province of Mendoza.)**
Rev. argent. Agron., 1945, **12**: 30-7.
On the basis of crop weights the effectiveness of the treatments was established, the increase of crop in the sprayed plots compared with that of the control plots being due to the protection given by the fungicides tried. The data obtained were analysed statistically by the method of variance and led to the conclusion that under the conditions of the experiment control of "mildew", *Peronospora viticola*, can be obtained with 1% neutral bordeaux mixture.

1594. MASSEE, A. M. 632.6/7: 634.1/7
Notes on some interesting insects observed in 1944.
A.R. East Malling Res. Sta. for 1944, **A28**, 1945, pp. 77-83.
Notes are given of observations on over 20 species of insects and mites during 1944, chiefly those infesting fruit trees. Among other insects 6 species of aphids were seen in June in one apple orchard in Essex.

1595. SCHLOTTFELDT, C. S. 632.6/7(811.6)
Insetos encontrados em plantas cultivadas e comuns-Viçosa, Minas Gerais. **(Insects infesting cultivated and common plants around Viçosa, Minas Gerais.)**
Ceres, 1944, **6**: 52-65, 108-27.
This is a list of the insects found on plants commonly grown in the state of Minas Gerais, Brazil. The host plants are arranged in alphabetical order.

1596. SHULL, W. E. 632.951
Idaho recommendations for insect control.
Bull. Idaho agric. Exp. Stat. **252**, 1944, pp. 63.
The insects are treated in the alphabetical order of their common names, while the index is arranged according to crops. Both horticultural and agricultural pests are considered.

1597. HIGBEE, E. C. 632.951.
Plantas inseticidas na América. **(Insecticidal plants of America.)**
Bol. Minist. Agric. Rio de J., 1943, **32**, 3: 27-35.
It is stated that more than 1,200 plants yield insecticidal substances extracted from roots, leaves, flowers, wood, seeds or bark; many of them are of little commercial value, but others are important. Notes are given on the use of the products from *Lonchocarpus* and *Derris elliptica*, sources of rotenone, *Tephrosia virginiana, Nicotiana tabacum, Pyrethrum, Anabasis aphylla, Cymbopogon* (*Andropogon*) *Nardus* for citronella oil, *Piper aduncum, Vetiveria zizanioides, Hyplophyton cimidium, Picraena excelsa* for quassia and others.

1598. MASSEE, A. M. 633.79-2.654.2
The hop red spider (*Tetranychus telarius* L.).
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 126-7.
The hop red spider materially reduced yields in Kent and Worcestershire in 1943 and 1944. The most important measure recommended for its control is a 1% lime-sulphur spray in May or early June, formula lime-sulphur 1 part, water 99 parts, wetter (according to makers' directions) about 6 oz., nicotine (to be added if hop fly is present) 5 oz.

1599. DUBLANC, J. 632.752
Die San José-Schildlaus. **(Quarantine measures against the introduction of the San José scale into Switzerland.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 367-71.
The paper deals with the Swiss regulations governing the introduction into Switzerland of plants and fruits from San José scale-infested countries. This category includes South Africa and Australia among countries of the British Empire.

1600. MICHELBACHER, A. E., AND SWANSON, C. 634.51-2.753
Factors influencing control of the walnut aphid.
J. econ. Ent., 1945, **38**: 127-8.
During the 1944 season the walnut aphid, *Chromaphis juglandicola*, proved to be a serious pest over much of the walnut-producing section of northern California. An application of nicotine dust made at Linden in San Joaquin County produced excellent kills but was given too late, as the ashy-grey ladybird, *Olla abdominalis*, had already built up an abundant population. Following the treatment this predator, which was left without food, disappeared and a severe re-infestation of the orchard occurred. The second infestation was controlled by another dusting which would have been unnecessary if more consideration had been given to the timing of the first nicotine application and to maintaining the balance between pest and predator.

1601. LAL, K. B., AND SINGH, R. N. 632.753: 632.96
Control of woolly aphis by *Coccinella septempunctata* Linn.
Ind. Fmg, 1945, **6**: 24-5.
At Chaubattia, the ladybird *Coccinella septempunctata* was found to control woolly aphis satisfactorily, whereas the predator is very scarce in the orchards of Ramgarh, although there is no difference in climate. Apparently, the absence at the latter place of an alternate host, e.g. the grasses *Andropogon partusus* and *A. assimilis*, which are present at Chaubattia, accounts for the absence of the beetle. It has, therefore, been decided to establish the two grasses near some orchards at Ramgarh to provide a host for the aphids.

1602. KJELLANDER, E. 632.753: 634.11
Biodluden. **(Woolly aphis in Sweden.)**
Växtskyddsnotiser, 1945, No. 3, pp. 39-42.
The woolly aphis did not reach Sweden until about 1930, at which time it began to invade the southern part of the country from Denmark. The pest was partly checked by the severe winters of 1939-41, but at present it continues to spread. Efforts are being made to prevent infestation of the fruitgrowing areas in north-western and eastern Scania. The treatments suggested consist of scraping and spraying.

1603. COX, J. A. 634.8-2.754
DDT for the control of grape leafhoppers [*Erythroneura* spp.].
J. econ. Ent., 1945, **38**: 278-9, bibl. 2.
DDT spray (Gesarol AK-20) was toxic both to adult and nymph leafhoppers and the residual effect lasted several weeks.

1604. GREENSLADE, R. M. 634.11-2.76
Observations on the life cycle of the apple blossom weevil (*Anthonomus pomorum* (L.) Curt.).
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 83-92, bibl. 15.
An account of the life history of *Anthonomus pomorum* is given, showing that information was lacking on the habits of the adult weevils. Biological observations in 1941 and 1942 showed that over-wintered adults were on the trees for a period of 53 days, and that egg-laying continued for at least 15 days, though a high proportion of the total was laid within 2 days. The approximate duration of the stages was: egg 12 days, larva 26 days, pupa 14 days, these figures being somewhat reduced for the later individuals. Dusting with derris powder under favourable conditions was not effective in reducing the amount of damage to the blossom of four different plots of trees. Six materials were tried as possible repellants to keep the weevils away from the trees. None was successful. The methods used for sampling the weevil population are briefly discussed. [Author's summary.]

1605. WIESMANN, R., AND FENJVES, P. 634.11-2.76
Die Überwinterung des Apfelblütenstechers (*Anthonomus pomorum* L.). **(The hibernation of the apple blossom weevil in Switzerland.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 396-401, 417-21, bibl. 5.
A study of the hibernation habits of the apple blossom weevil in Switzerland shows that a contact poison (DDT) applied at the time of the post-hibernation feeding is the only means of controlling the pest.

1606. STEINER, H. M. 634.22-2.768
Factors affecting survival of plum curculio in peach orchards.
J. econ. Ent., 1945, **38**: 116-7, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1256**.
The effects of soil type, location of pupation, certain climatic factors and cultural practices on adult emergence of plum curculio in peach orchards are briefly reported. The use of mulch beneath fruits, at the rate of 2½ tons of dry grass per acre, proved more efficient in reducing survival than other cultural treatments tested.

1607. GÖTZ, B. 634.711-2.76
Neue Bekämpfungsmittel gegen den Himbeerkäfer. **(New chemicals for the control of the raspberry beetle.)**
Dtsch. Obstbau, 1943, p. 156, from abstract *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 30.
Among the new chemicals tested for the control of the raspberry beetle, one dust in particular, which is not specified in the abstract, is reported to have given excellent results. The new chemicals, which are claimed to have a better residual effect than pyrethrum or nicotine, were successfully applied also on strawberries.

1608. BARDIA BARDIA, R. 634.63-2.76
Una plaga importante en los olivares léridanos. **(An important pest of olives in Lérida.)**
Anal. Esc. Agric., Barcelona, 1942, **2**: 43-59.
Serious damage has been caused to olive trees in recent years, particularly in the province of Lérida (Catalonia) by two bark beetles, *Hylesinus oleiperda* Fab. and *Phloeotribus scarabaeoides* Bern. The former, a new record for the district, is the chief cause of the damage; the latter, which has been known for a long time, is of secondary importance. Both cause galleries in the branches. They attack weak trees preferably, and severe frosts cause the trees to be predisposed to the injury produced. The treatments recommended are: severe pruning to remove affected parts, the prompt burning of all branches cut off, green manuring with vetches, supplemented by phosphatic and potassic fertilizers, and thorough cultivation to aerate the soil.

1609. LANGFORD, G. S., MUMA, M. H., AND CORY, E. N. 632.76: 632.951
DDT as an automatic killing agent in Japanese beetle traps.
J. econ. Ent., 1945, **38**: 199-201.
DDT in solid or liquid media proved an effective killing agent for automatic Japanese beetle traps.

1610. LANGFORD, G. S., AND CORY, E. N. 632.76: 634.1/7
DDT to control Japanese beetles on fruit.
J. econ. Ent., 1945, **38**: 202-4.
Fruit or foliage coated with spray residues containing DDT was repellant to Japanese beetle and DDT dust-coated foliage was also repellant. The period of protection varied, ranging generally from 7 to 14 days, on grape foliage 11 to 20 days.

1611. JONES, S. C. 634.23-2.77
DDT as a control for cherry fruit fly.
J. econ. Ent., 1945, **38**: 122, being *Tech. Pap. Ore. agric. Exp. Stat.* **448**.
DDT was tested against the cherry fruit fly in the laboratory and in the field. In the cages, the lethal action of all DDT preparations employed was slow, while one application of DDT, at concentrations of 2% and of 3% combined with 50% electric sulphur and talc, proved ineffective in two cherry orchards.

1612. JENKINS, C. F. H. 634.1/8-2.77
The Mediterranean fruit fly.
J. Agric. W. Aust., 1944, **21**: 200-6.
The Mediterranean fruit fly [*Ceratitis capitata*], by far the most serious insect pest of fruit in Western Australia, is described. In a discussion of baiting and sanitary control measures, growers, especially backyard growers, are urged to limit the height of their trees, particularly figs and loquats, so that the fruit can be easily reached.

1613. DE AZEVEDOA, A. R. 634.63-2.77
O valor da colheita precoce da azeitona como método preventivo de combate ao *Dacus oleae* Gmel. **(The value of the early picking of olives as a preventive measure against the olive fly.)**
[English summary, ½ p.]
Agron. lusit., 1943, **5**: 83-9.
Methods generally employed against the olive fly have not proved satisfactory. Picking the olives early offers another means of control, since the maggots are then destroyed by the methods used in oil-extraction. In late picking the maggots escape by leaving the fruit and pupating in the ground. Recently it has been found that when the fruit is picked rather early the larvae pupate readily and the adults emerge before winter, thus preventing, to some extent,

the overwintering of the fly in the pupal stage. The fly thus has to pass the winter in the adult stage and many perish in consequence.

1614. BAPTISTA, J. E. 634.63-2.77
O emprêgo da argila e do enxôfre como repulsivos no luta contra o *Dacus olee* Gmel. **(The use of clay and of sulphur as repellants for protection against *Dacus oleae* Gmel.)** [English summary, ½ p.]
Agron. lusit., 1943, **5**: 57-66.

Two substances used as repellants in the control of the olive fly, *Dacus oleae* Gmel, were sulphur and clay, the former as a dust, the latter as a spray mixed with copper sulphate and lead arsenate. They were applied in July, August and October. The percentage of infected fruits on the sprayed trees was 6 against 51·4 on those unsprayed.

1615. MASSEE, A. M. 632.78
Codling moth (*Cydia pomonella* L.).
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, p. 127.

A commercial control of codling moth can be obtained by a spray of lead arsenate powder 2 lb. (or paste 4 lb.) in 100 gal. of water, during the latter part of June or not later than the end of the second week of June in an early season, in the fruitgrowing areas of the south-east and east of England.

1616. WOODSIDE, A. M. 634.11-2.782
Codling-moth infestation at different heights in apple trees.
Bull. Va agric. Exp. Stat. **360**, 1944, pp. 10, bibl. 10.

Codling moth infestation in apple trees was found to increase with height, particularly in sprayed trees. Thinning out in pruning to permit the spray to penetrate to the inside and the use of towers on top of the tanks should help to reduce codling moth injury in the tree tops.

1617. ANON. 632.78: 634.1/2
La Carpocapsa. **(The codling moth.)**
Sugest. oport., Rio Negro, Sept. 1944, 4 pp., Feb. 1945, 4 pp.

The codling moth (*Carpocapsa pomonella*=*Cydia pomonella*) is stated to be the chief pest of fruit in Rio Negro. Three broods in the year and the difficulty of checking the second and third necessitate very thorough control of the first. The measures recommended are (1) scraping the trunk, (2) lead arsenate spray, and (3) trapping by corrugated paper round the trunks.

1618. MARSHALL, J. 632.78
Phenothiazine in codling moth control.
Sci. Agric., 1945, **25**: 546-50, bibl. 7, being *Contr. Div. Ent. Sci. Serv. Canada Dep. Agric.* **2358**.

Tests for the control of codling moth carried out in British Columbia from 1937 to 1944 showed that on a pound-for-pound basis micronized phenothiazine with the addition of a small quantity of stove oil was 4 times as effective as lead arsenate. The chemical is recommended for use in early cover sprays, second brood applications having a tendency to affect fruit colouration. Observations by other authors that phenothiazine favours the development of European red mite (*Paratetranychus pilosus*) and Pacific mite (*Tetranychus pacificus*) are confirmed.

1619. BENNETT, S. H., KEARNS, H. G. H., AND MARSH, R. W. 634.11-2.78 +2.42
A field trial on the combined control of codling moth and brown rot of apples.
A.R. Long Ashton hort. Res. Stat. for 1944, 1945, pp. 157-61, bibl. 1.

Cordon trees of Cox's Orange Pippin sprayed at the end of June with washes containing either copper oxychloride (Bouisol) or ferric dimethyldithiocarbamate (Fermate) showed about 2% fruit infection with brown rot in October compared with 10% in the control plots. But Bouisol caused serious defoliation and russeting and Fermate left a tenacious, disfiguring deposit. For use on apples the selection of a material combining the fungicidal value and safety of the thiocarbamate group with a non-objectionable spray residue has yet to be made.

1620. WOODSIDE, A. M. 632.78
Supplementary control measures for codling moth.
Bull. Va agric. Exp. Stat. **342**, 1942, pp. 19.

The control measures against codling moth suggested in this bulletin are not meant to offer a substitute for conscientious spraying but are supplementary and consist chiefly of improved sanitation in heavily infested orchards. The recommendations to growers include the following points: (1) A tightly constructed packing shed is necessary to trap the moths inside. (2) Submerge the boxes for one minute in boiling water to kill the worms cocooned in them. (3) Stack prop poles outside the orchard or cover them with cheese cloth to prevent the escape of moths. (4) Scrape the rough bark from the trees during the winter and burn it. Cover all cavities and areas of dead wood with 12-mesh screen wire to trap hibernating moths or fill cavities with cement. Remove all split branches and burn prunings. (5) A 35-50% reduction of infestation may be obtained by the use of bands carrying a chemical coating of not less than 6¼ lb. per 250-foot roll of 2-in. band. (6) A reduction of infestation by about 50% was obtained by placing a bait trap in each tree early enough to catch the first spring brood flight before they laid their eggs, i.e. 7-10 days after petal fall. The bait used consisted of 1 part of stock syrup (low grade molasses) and 20 parts of water, to each quart of which was added 1 c.c of anethol emulsified with bentonite. Suggestions for the destruction of worms in culls and in fruit removed in thinning are also made.

1621. GRAHAM, C. 632.78: 632.951
DDT sprays to control codling moth in Maryland.
J. econ. Ent., 1945, **38**: 272-3.

Tests at College Park, Maryland, indicate that DDT used at all strengths greater than ½ lb. [substance used was Gesarol AK20 spray containing 20% GNB-A-DDT] per 100 gallons and in all combinations gave control of codling moth as good or better than the standard sprays used as controls. There are also indications that when DDT is used at 1 lb. or more per 100 gallons of spray the percentage of clean fruit is approximately the same regardless of size of crop. This is not true in case of the standard schedules.

1622. HARMAN, S. W. 634.78: 632.951
DDT in the codling moth program for Western New York.
J. econ. Ent., 1945, **38**: 280-1.

Indications are given that DDT may prove a good substitute for lead arsenate against codling moth. Used at 0·8 lb. per 100 gallons control equal to that from 3 lb. lead arsenate could be expected. There was no apparent injury to fruit or foliage. The residue was not toxic to codling moth and apple aphids a few weeks after application.

1623. WHEELER, E. H. 634.14-2.78
DDT and Ryanex to control oriental fruit moth [*Grapholitha molesta*] on quince.
J. econ. Ent., 1945, **38**: 281-2, bibl. 4.

Ryanex proved worth further trial. DDT at 1 lb. per 100 gallons had very striking results. The residual effects observed were much greater than those noted on apple, possibly owing to the dense pubescence of the fruit surface. There was no apparent injury to fruit or foliage, but it should be noted that at harvest fruits from the DDT treatments were still green and quite pubescent as compared with the uniform yellow and nearly glabrous condition of those treated otherwise.

1624. HAEUSSLER, G. J. 632.78: 632.96
***Gambrus stokesii* Cam., an Australian parasite of codling moth and oriental fruit moth.**
J. econ. Ent., 1945, **38**: 103-6, bibl. 4.

Following breeding experiments about 6,500 *Gambrus stokesii* adults were released in apple and peach orchards in 27 localities in the United States. That the parasite has been established is not yet certain.

1625. SCHNEIDER, F. 634.11-2.78
Massenauftreten der Apfelblattminiermotte (*Lyonetia clerkella*). **(An outbreak of apple leaf miner infestation in north-west Switzerland.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 342-3.

A severe apple leaf miner infestation in north-west Switzerland is recorded, but control measures cannot be suggested. As a sop to growers it is noted, however, that a serious outbreak lasting 1-3 years is usually followed by a period of freedom from the pest.

1626. MENZEL, R. 634.23-2.78
Die Bekämpfung der Kirschblütenmotte. **(The control of the cherry fruit moth [*Argyresthia nitidella*].)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 109-11.

In a cherry orchard in Switzerland cherry fruit moth infestations of 40-80% were reduced to negligible proportions by spraying with different dinitrocresol preparations and a dinitrocresol-tar oil combination, while 3 different emulsified fruit tree carbolineums failed to control the pest. It is thought possible that the failure of the fruit tree carbolineums may be due to the late date of spraying (15 and 16 March) and a repetition of the trial is intended.

1627. MENZEL, R. 634.23-2.78
Versuch zur Bekämpfung der Kirschblütenmotte mit verschiedenen Winterspritzmitteln. **(The control of the cherry fruit moth with different winter washes.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 382-4.

For 1944 results see *ibidem*, 1945, 54: 109-11, *previous abstract*. In 1945, control of the cherry fruit moth by emulsified fruit tree carbolineum was equally poor, although the application was made in the middle of February. Dinitrocresol preparations gave again excellent results.

1628. BOBB, M. L. 634.25-2.78
Ethylene dichloride emulsion and paradichlorobenzene crystals in peach tree borer control.
Bull. Va agric. Exp. Stat. **347**, 1943, pp. 11, bibl. 13.

The newly introduced method of controlling the peach tree borer by a soil fumigant, a 25% ethylene dichloride emulsion, proved slightly more effective than the standard control measure by paradichlorobenzene crystals. A warm period during October was found to be the most favourable time for applying the emulsion. No injury was experienced when the liquid (agitated before use) was not poured directly on the trunk. On clay soils the ground around the trees should be loosened previous to the application. Surface loss of the fumigant after treatment was prevented by placing two shovelfuls of soil around the tree.

1629. SHULL, W. E., AND WAKELAND, C. 634.22-2.78
The *Mineola* moth or destructive prune worm.
Bull. Idaho agric. Exp. Stat. **242**, 1941, pp. 7.

The destructive prune worm, *Mineola scitulella*, was first discovered in Idaho in 1925 and has since spread over all south-western prune-growing areas of the state. Tests have shown that control is obtained by spraying 2¾ pints of pyrethrum extract (2 g. pyrethrin per 100 ml.) plus 4 gallons of emulsified oil in 96 gallons of water. The spray must be applied within 2-6 days after 95% of the overwintering larvae have emerged, which is approximately at the time when the buds are swelling and show green at the tips. Lime-sulphur, though not a direct means of control, may have a cumulative effect.

1630. BARDIA BARDIA, R. 632.78
Observaciones sobre los "Hyponomeutidae" en el llano de Urgel (Lérida). **(Observations on the *Hyponomeutidae* in the Urgel plain of Lerida.)**
Anal. Esc. Agric. Barcelona, 1943, **3**: 13-23.

The ermine moth, *Hyponomeuta padella* L., has been a pest for many years in the Urgel plain of the province of Lérida, Catalonia. Recently it has extended its range of hosts in that region, and in the spring and summer of 1942 there were severe attacks on almonds; the variety Marcona was severely affected while the variety Desmayo suffered much less. It attacks hawthorn also, and the numerous hawthorn bushes in the area serve as foci for its perpetuation. Having difficulty in obtaining arsenical compounds for spring spraying, the author tried fluosilicate of barium at 0·75% with good results. Another species, *H. rorellus*, occurs on willows in the region.

1631. HUTSON, R. 634.73-2.78
Controlling the fruitworm on blueberries [*Mineola vaccinii*].
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 283-4.

After an initial stage of blueberry growing on a large scale, which enjoyed almost complete freedom from insect troubles, the cranberry fruitworm has now established itself as a very serious pest of the crop. Two years' experimental results, however, indicate that a high degree of control may be achieved by spraying with 1% rotenone plus spreader or with a mixture of 1 qt. summer oil and 3 lb. factory processed, fixed nicotine at the rate of 200-250 gal. per acre in a fully grown planting, when the berries are about the size of buckshot, and again 10 days later.

1632. WOODSIDE, A. M., AND OTHERS. 634.11-2.693.2
Control of field mice in apple orchards.
Bull. Va agric. Exp. Stat. **344**, 1942, pp. 16.

The control of field mice in apple orchards was studied in Augusta County and Patrick County, Virginia, during the winters 1939-42 and in the spring and summer months of 1942. It was found that better results are obtained with a change of poison and bait than by using a uniform poison bait throughout the campaign. The use of wooden covers, 15-18 in. square, are recommended as so-called observation stations. These covers induce the mice to make shallow runs; they are placed on the ground, where mouse runways have been located under trees, 10-14 days before the first poisoning. Later, the poison bait should be placed in the runways under each cover where the mice have been active. In moderately or heavily infested orchards 4 or 5 applications of bait should be made during the first month, changing both bait and poison after the second application. Tests with cyano gas and engine exhaust gas have not led to definite conclusions but merit further trial.

1633. RAUCOURT, M., AND BÉGUÉ, H. 632.951 + 632.952
Revue de phytopharmacie. VI. **(Insecticides and fungicides.)**
Ann. agron. Paris, 1942, **12**: 451-86, bibl. 137.
RAUCOURT, M.
Revue de phytopharmacie. VII. **(Insecticides and fungicides.)**
ibid., 1943, **13**: 442-60, bibl. 85.

Recent progress in the field of plant protective materials are discussed under the following headings:—VI. Physical considerations (e.g. degree of fineness, etc.), copper salts, tar oils, fumigants, insecticides of plant origins, little known antiparasitic substances (i.e. thallium salts, selenium,

phosphorus, emetics, inert powder). VII. Biological control, sulphur and its derivatives, arsenicals, synthetic organic fungicides and insecticides, spray aids (e.g. wetters, etc.).

1634. Overholser, E. L., Allmendinger, D. F., and Overley, F. L. 634.11-2.95: 581.132
The effect of certain sprays upon the apparent photosynthetic activity of apple trees.
Bull. (Tech. Pap.) Wash. agric. Exp. Stat. **447**, 1944, pp. 28, bibl. 6.

1. The use of medium- and light-medium oils throughout the season in the control of codling moth tends to lower the apparent carbon dioxide intake of apple leaves. 2. The use of light-medium oil with fluorine throughout the season reduced the carbon dioxide intake of apple leaves. 3. The use of light mineral oil with first brood codling moth sprays involving lead arsenate and nicotine sulphate, or lead arsenate and calcium arsenate, or lead arsenate or modified Dynamite, followed in each case by fluorine second brood sprays did not reduce carbon dioxide intake of apple leaves. 4. The use of light mineral oil and lead arsenate throughout the season did not significantly lower the carbon dioxide intake of apple leaves. 5. The use of either lead arsenate or calcium arsenate Dynamite combinations, even when followed by second brood fluorine sprays, reduced the carbon dioxide intake of apple leaves. 6. The use of modified Dynamite sprays was not so serious in their reduction of carbon dioxide intake by apple leaves as were the Dynamite sprays. 7. Herring oil in the relatively small amount recommended (one pint per 100 gallons) tends to be less injurious to foliage than do medium (65 to 75 viscosity) or light-medium (60-65 viscosity) mineral oils at larger concentrations of one-half to one gallon per 100 gallons, used commercially. 8. The use of calcium arsenate with mineral oil is less likely to reduce carbon dioxide intake of apple leaves than is the use of lead arsenate with the same amounts of comparable oils. 9. Calcium arsenate with adequate amounts of " safeners " such as zinc sulphate and calcium hydrate may be used without materially affecting the carbon dioxide intake of apple leaves. 10. The use of oils with nicotine sulphate without other materials, resulted in a greater reduction of carbon dioxide intake by apple leaves than when comparable oils in similar amounts were used with calcium arsenate, lead arsenate, or bentonite. [Authors' summary.]

1635. Rasmussen, E. J., Hutson, R., and Cation, D. 632.95: 634.1/2
Spraying calendar.
Ext. Bull. Mich. St. Coll. Ext. Serv. **154** (5th revision), 1945, pp. 55.

The discussion of spray and dust materials and of the life histories and control practices of fruit pests and diseases is followed by a spray schedule for apples, plums, peaches, pears, and sour and sweet cherries under Michigan conditions.

1636. Anon. 632.95: 634.1/8
Calendario de pulverizaciones para el año 1944-45. **(Spray calendar for the year 1944-45.)**
Rev. B.A.P., 1945, **28**: 326: 55-6.

This is a spray-calendar of the usual type, for use in Argentina for the control of the chief diseases and pests of the vine, apples and pears, peaches, plums, cherries and apricots.

1637. Thies, W. H., and others. 632.95
Spraying and dusting fruit trees.
Leafl. Mass. St. Coll. Ext. Serv. **178** (revised), 1943, pp. 28.

Timing and method of application assume, in the authors' view, a position of greater importance in spraying or dusting for orchard pests than the choice of materials. The discussion of the spraying equipment, covering both the more primitive pumps of small growers and the modern power sprayer, includes the formula for the calculation of the capacity of a pump and two tables which record the pressure at the nozzle for different hose lengths and for different amounts of spray delivered, and the number of gallons discharged from a broom according to the size of the holes in the discs and the number of nozzles. Other points treated are the properties of some important fungicides, insecticides and spreaders and stickers; mixing methods, the relation of spraying technique to individual orchard conditions and different pests; a description of common spraying methods with diagrams of spray distribution according to the method used; methods of dusting; prevention of spray injury.

1638. Hopperstead, S. L. 632.95
New developments in spraying and dusting equipment.
Abstract in *Phytopathology*, 1945, **35**: 485-6.

A brief review was presented of the development and performance of the Speed Sprayer, Vertical Boom Attachments, Cornell Sprayer-Duster, California Sprayer-Duster, and the use of aerosols. The possibilities of adapting the aerosol principle for control of field and storage troubles of commercial crops were advanced and experimentation along these lines encouraged.

1639. E.P[eyer]. 634.8-2.95
Ein praktisches Gerät für die Direktbespritzung mit Schläuchen im Rebbau. **(A practical appliance for spraying vines with hose pipes.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 324-5.

A description of the hose pipe reel " Hirt ", which has proved to be a considerable improvement on similar appliances, when tested for vine spraying at Wädenswil.

1640. Rasmussen, E. J., and Sheldon, W. H. 632.95
Filling the spray tank.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 303-8.

The construction of a spray tank refiller from pipe fittings is described. Photographs and diagrams are presented in support.

1641. Persson, G. R. 631.588.1: 632.95
Elektrospruta. Ett steg i rätt riktning. **(The electric sprayer—a step in the right direction.)**
Fruktodlaren, 1943, No. 3, pp. 71-3.

The successful conversion of a motor sprayer into an electric sprayer is described. Although this experiment was prompted by the acute petrol shortage in Sweden during the war, it is thought possible that the development of electrical equipment for spraying may prove an economical proposition in regions where cheap current is available.

1642. Oliveras Massó, C. 632.9: 634.8 + 634.25
Tratamientos inmunizantes y vigorizantes de los vegetales. **(Immunizing and invigorating treatments for plants.)**
Anal. Esc. Agric., Barcelona, 1942, **2**: 307-33.

Good results are described as having been obtained by preparations (the composition is not divulged), compounded by an agriculturist, Señor Boladeres, and applied, by puncturing or by painting pruning cuts, to young grape-vine plants, immunizing them against phylloxera and inducing good growth. Peach trees receiving the " Boladeres treatment " recovered from chlorosis and developed more vigorously than untreated trees.

1643. Ruth, W. A. 632.95
The first legal tolerance on spray residues.
Ill. Hort., 1944, Vol. 33, No. 4.

The legal tolerance for fluorine on apples and pears, to be established in the United States, will be 7 mg. per kg. or approximately ·05 grain per lb.

1644. EBELING, W., AND OTHERS. 632.951
Addition of extractives of rotenone-bearing plants to spray oils.
Hilgardia, 1944, **15**: 675-701, bibl. 26, being *Pap. Calif. Citrus Exp. Stat.* **499**.

Powdered extractives of rotenone-bearing plants may be dissolved directly in spray oil at room temperature in concentrations of insecticidal value by mixing the powder in oil for a 20-minute period. In the same manner the extractives may be obtained from finely divided plant material. In either case an emulsive oil was found to be a better solvent for the extractives than straight oil of the same grade; and to obtain the highest concentrations in oil, mutual solvents must be used. A *solubilizer* is a mutual solvent which in very dilute concentration, usually 1% or less, will produce a thermodynamically stable colloidal aqueous or non-aqueous solution of otherwise insoluble or only slightly soluble substances. The term *oleotropic solvent* is proposed for mutual solvents which, when added to an oil in *large amounts*, will increase the solubility of an otherwise insoluble or slightly soluble substance in oil merely by adding their solvent properties to that of the oil. Cardolite 627 is a highly efficient solubilizer for incorporating derris extractives in spray oil, forming a visually clear, stable solution which is probably mainly colloidal; but *n*-butyl phthalate, as an example of a good oleotropic solvent, will form a slightly cloudy solution when 5% derris extractives in *n*-butyl phthalate is added to spray oil at the rate of 1 part to 7 parts of oil. Nevertheless an oil spray with an optimum concentration of derris extractives brought into partial solution in the oil by means of *n*-butyl phthalate as a mutual solvent is far more effective against the California red scale than an oil spray used at the same strength and containing the same concentration of derris extractives, but having Cardolite 627 as a solubilizer. The increase in the insecticidal effectiveness of the oil due to the addition of a solution of *n*-butyl phthalate extractives is brought about despite the reduced amount of oil deposited on the tree surface because of the emulsifying effect of the mutual solvent. Freshly prepared kerosene-Cardolite-extractives solutions are highly effective against the red scale when added to kerosene to make a 0·103% concentration of total extractives (0·031% concentration of rotenone) in the kerosene. A 6-weeks' period was sufficient to cause considerable decomposition of the toxic solution in which Cardolite was used as a solubilizer. This decomposition can be minimized by the addition of an antioxidant. An adequate concentration of derris or cubé extractives can be obtained merely by soaking ½ lb. finely ground derris or cubé root in 10 gallons of kerosene for 20 minutes. This results in a concentration of rotenone plus deguelin in the kerosene of 0·05 grams per 100 ml. The finely ground root also increases the effectiveness of regular oil spray when added at the rate of 4 oz. to 1 gallon of regular spray oil. A continuous stirring of ground cubé root in emulsive spray oil for 20 minutes will result in the maximum degree of extraction of the toxic ingredients from the root particles. When added to spray oil, the rotenone-free extractives (deguelin concentrate) of derris appear to be about as effective as rotenone when identical concentrations of each are used. However, the complete extractives are more effective than equal concentrations of either the rotenone or the rotenone-free extractives used by themselves; evidently the latter two are synergistic. It is suggested—since in the preparation of spray oils with toxicants a certain percentage precipitates upon standing—that the mutual solvents and extractives be prepared in a separate solution, to be added to the oil just before the oil is poured into the spray tank. An oil film on the tree, impeding the settling and development of "crawlers" issuing from scales not killed by an oil spray was demonstrated to influence markedly the effectiveness of the treatment 9 months after spraying when the oil-toxicant spray was compared with a kerosene-toxicant spray, which leaves no oily residue because of rapid penetration and evaporation of the kerosene. However, when the initial per cent. of kill from a kerosene-toxicant spray was sufficiently high (99·5%) it more than offset the disadvantage of lack of oily residue, and resulted, after a 9-month interval, in trees more free of scaly lemons than those sprayed with the regular light-medium spray oil with or without a toxicant. [From authors' summary.]

1645. STEINER, H. M. 634.25-2.95+2.954
Ground cover sprays to kill insects and weeds in peach orchards.
J. econ. Ent., 1945, **38**: 117-9, bibl. 1, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1257**.

Tests of insecticides with herbicidal properties were carried out at the Arendtsville Laboratory and at the Battlefield Peach Orchard, Gettysburg, Pa. Two mixtures had shown outstanding effectiveness at low concentrations in initial trials: (1) G-410 (1 lb. pentachlorphenol per quart in a carrier) at the rate of 2 quarts per 100 gal. spray containing 2 gal. petroleum oil and 2 oz. B-1956 (a proprietary spreader emulsifier), and (2) 40% DNOCHP (dinitro-ortho-cyclon hexyl phenol) powder at the rate of 2 lb. per 100 gal. spray as above. Applications of each of these mixtures, made on 15 August, were highly effective in killing the top growth of all weeds encountered in the orchard. Results previously obtained indicate that similar sprays should be applied only on sunshiny days. The effect of the treatment on insects in the orchard came up to expectation. Dead and dying grasshoppers and tarnished plant bugs were found on weeds and on the ground within a few minutes of spraying. The amount of dilute spray used, less than 3 quarts per 100 square feet, is believed to be insufficient to cause injury to the tree, if the materials are kept from the trunk and foliage.

1646. HORSFALL, J. G. 631.952
Quantitative bioassay of fungicides in the laboratory.
Bot. Rev., 1945, **11**: 357-97, bibl. 125.

A number of standard terms are defined. The chapters headed Treatment of surfaces, Spore germination test, Greenhouse tests on foliage and seeds, The dosage response curve, Value of a standard fungicide and The threshold, contain matter of interest to the horticultural scientist.

1647. GROVES, A. B. 632.952.1
The elemental sulfur fungicides.
Tech. Bull. Va agric. Exp. Stat. **82**, 1942, pp. 61, bibl. 29.

The elaboration of the characteristics of elemental sulphur fungicides is supported by 34 photographs on 17 page plates showing sulphur particles in different spray materials.

1648. ABBOTT, C. E. 632.951: 632.952
The effects of DDT and of sodium monofluoracetate upon *Physarella oblonga* Morgan.
Science, 1945, **102**: 71, bibl. 1.

DDT was found to have no pronounced effect on the slime mould, *Physarella oblonga*, while sodium monofluoracetate showed some action.

1649. MARTIN, H., AND WAIN, R. L. 632.951
The qualitative examination of insecticidal properties. Progress report, 1944.
A.R. Long Ashton hort. agric. Res. Stat. for 1944, 1945, pp. 121-40, bibl. 7.

(1) The simple qualitative tests of insecticidal properties have been examined as the basis of quantitative methods by bio-assay:—(*a*) The sandwich method for stomach poisons does not reveal the minimum lethal dose, the amount of poison ingested being determined by the speed of action of the poison and the appetite of the test organism. (*b*) Tests of protective contact toxicity by a simplified "film" technique are amenable to quantitative development. (2) D.D.T. has been shown, by chemical and biological

methods, to be compatible with alkaline components such as lime-sulphur and bordeaux mixture likely to be used in combined sprays and to be effective in the presence of petroleum oil sprays. (3) On the basis of bio-assay with D.D.T. and related compounds, it is concluded that D.D.T. is insecticidal because it satisfies the following requirements: (*a*) ability to penetrate to and to concentrate at a sensitive interface within the organism; (*b*) adequate stability to reach this site of action; (*c*) ability to release hydrogen chloride when adsorbed at the sensitive interface. (4) Requirement (3) (*c*) is revealed by the results of tests of compounds analogous to D.D.T., but in which the $=CH-CCl_3$ group is modified. A rough parallelism exists, in the compounds tested, between insecticidal potency and the ease of HCl elimination. (5) Requirement (3) (*a*) is operative in compounds analogous to D.D.T. but containing *p*-substituents other than chlorine; derivatives in which this substituent is polar, e.g. $-OH$, $-O{\cdot}COCH_3$ or $-CONH_2$, are less toxic than those with non-polar substituents, e.g. $-Cl$, $-CH_3$, $-OCH_3$. (6) When the *p*-substituent is halogen, a trend in toxicity is shown which is greatest in the fluorine and least in the bromine and iodine analogues. (7) For reasons 3 (*a*)-(*c*) hexachlorcyclohexane shows high insecticidal properties, though the interpretation of the results obtained with an unknown mixture of its isomers is complicated by its ability to act as a fumigant. The sample examined was ineffective against larger instars of *Mamestra brassicae* larvae, though highly toxic to the other test organisms used. (8) In a limited range of aromatic nitriles, the *o*- and *p*-substituted benzonitriles gave promising results as contact poisons and fumigants, but were not stomach poisons. [Authors' summary.]

1650. LÄUGER, P., MARTIN, H., AND MÜLLER, P. 632.951
Ueber Konstitution und toxische Wirkung von natürlichen und neuen synthetischen insektentötenden Stoffen. **(Constitution and toxicity of natural and new synthetic insecticidal materials.)**
Helv. chim. Acta., 1944, Vol. 27, from review *Schweiz. Z. Obst-u. Weinb.*, 1944, **53**: 328-9.
A publication from the research laboratories of the Swiss firm Geigy AG., Basle, dealing chiefly with the development of Gesarol and Gesapon (D.D.T.) for the control of soil pests and a few other insecticides of no horticultural significance.

1651. BARKER, C. H., RIPPER, W. E., AND WARBURG, J. W. 632.951
The effect of pH on the ovicidal properties of winter washes containing dinitro-*o*-cresol.
J. Soc. chem. Ind. Lond., 1945, **64**: 187-8, bibl. 5.
The variation with change of pH in the aqueous solubility of dinitro-*o*-cresol and in its distribution between petroleum oil and water in the proportions commonly used in winter sprays has been investigated; and it is found that nearly all the dinitro-*o*-cresol migrates from the oil to the water as the pH is raised from 4 to 7. Tests on the ovicidal properties of dinitro-*o*-cresol petroleum oil emulsions showed that an emulsion adjusted to pH 9 had to be applied at three times the concentration of the same emulsion adjusted to pH 4 to produce the same percentage kill of *Aphis fabae* eggs. [From authors' summary.]

1652. SHAW, H., AND MOORE, M. H. 632.951
Mercurated lead arsenate. What is it? What does it do?
Fruitgrower, 1945, **100**: 121-2, 143, and *A.R. East Malling Res. Stat. for 1944*, **A28**, 1945, pp. 128-30.
The development of the combined fungicide-insecticide known as "Mercurated Lead Arsenate" is traced from earlier investigations of the fungicidal properties of phenyl mercury chloride, the pure substance on which that preparation is based. Field trials showed phenyl mercury chloride at 0·005% to be approximately as effective as lime-sulphur at 1%; results differed according to the form of preparation. At 0·01%, apple scab-control was improved, but damage resulted. [Authors' summary.]

1653. PENDSE, G. S., PHALNIKAR, N. L., AND BHIDE, B. V. 632.951
Investigation of new plant-larvicides with special reference to *Spilanthes acmella*.
Curr. Sci., 1945, **14**: 37-8, bibl. 3.
An ether extract of the fresh flowering tops of *Spilanthes acmella* was found to be lethal to anopheline larvae in a dilution of 1: 100,000. Extracts of *Aristolochia bracteata* and *Butea frondosa* also showed a fairly good action.

1654. MCCOOL, M. M. 631.841.5: 632.954
Use of sodium cyanide for the eradication of undesirable plants.
Contr. Boyce Thompson Inst., 1945, **13**: 473-7, bibl. 1.
The destruction is described of dandelion, plantain, crab grass, foxtail grass, quack grass, hedge bindweed, European bindweed, honeysuckle and poison ivy by means of sodium cyanide applied in solid form and in solution at various concentrations.

1655. CRAFTS, A. S. 632.954
A new herbicide, 2,4 dinitro-*o*-secondary butyl phenol.
Science, 1945, **101**: 417-8, bibl. 2.
A new herbicide is suggested consisting of 5-10% 2,4 dinitro-*o*-secondary butyl phenol, 3-6% fuel oil and emulsifier. A concentrated stock solution of this effective mixture, which will kill also certain oil-tolerant weeds not ordinarily controlled, may be emulsified with water in the field, saving hauling costs. Data are presented of the solubility in kerosene of 6 dinitro compounds and of their toxicity relative to 2,4 dinitro-*o*-secondary butyl phenol.—College of Agriculture, Davis.

1656. WIKSTRÖM, H. 634.1/2-1.45-2.944
Formalinbehandling mot jordtrötthet i en gammal fruktträdgård. **(Formalin for soil sickness in old orchards.)**
Fruktodlaren, 1945, No. 3, pp. 93-5.
A number of large 50-year-old fruit trees, mostly apples, which had got out of hand, were grubbed and the soil subsequently treated with 10% formalin at the rate of 10 litres for an area of 1 m. radius around the new stakes. Manure and fertilizers were also applied. The plot was immediately replanted to fruit trees, of which 80 were dwarf trees of the varieties James Grieve, Gravenstein, Cox's Pomona and Cox's Orange. No symptoms of soil sickness appeared, the trees having come into bearing after 2-3 years.

1657. BATT, R. F., AND MARTIN, H. 633.71: 632.951.1
The home-production of nicotine.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 140-4, bibl. 4.
Two strains of *Nicotiana tabacum* and one of *N. rustica* were grown in the glasshouse and outside. Only in headed and disbudded plants of glasshouse-grown *N. rustica* were the yields of nicotine at all promising (65·6 and 60·1 lb. per acre). This does not indicate a successful future for home-produced nicotine.

1658.
a ALLEN, H. W. 632.78: 632.96
Sources of overwintering *Macrocentrus ancylivorus*.
J. econ. Ent., 1945, **38**: 119-20.

b BAINES, R. C. 634.11-2.42
The maturation and discharge of ascospores of the apple scab fungus in Indiana and its significance in control of scab.
Bull. Ind. agric. Exp. Stat. **471,** 1942, pp. 13, bibl. 6.

c BLODGETT, E. C. 632.1/8: 634.7
Diseases of small fruits in Idaho.
Bull. Idaho agric. Exp. Stat. **246,** 1942, pp. 27.

d BOBB, M. L. 632.78: 632.96
Parasites of the oriental fruit moth and of certain weed-infesting larvae.
Tech. Bull. Va agric. Exp. Stat. **79,** 1942, pp. 23, bibl. 11.

e BOURNE, A. I., AND OTHERS. 634.11-2.6/7
Apple pests and their control.
Leafl. Mass. St. Coll. Ext. Serv. **189** (revised), 1944, pp. 56.

f BRANAS, J., BERNON, G., AND LEVADOUX, L. 634.8-2.8
Le court-noué de la vigne. **(Court noué of the vine, symptoms, cause, damage and control.)**
Montpellier, 1939, 19 pp.
A concise and useful bulletin.

g BREAKEY, E. P. 634.711-2.654.2
***Phyllocoptes gracilis*, a pest of red raspberry in the Puyallup Valley.**
J. econ. Ent., 1945, **38**: 121-2, being *Sci. Pap. St. Coll. Wash. agric. Exp. Stat.* **632.**

h CAGLE, L. R. 632.654.2
Life history of the spider mite *Tetranychus schoenei* MCG.
Tech. Bull. Va agric. Exp. Stat. **87,** 1943, pp. 16.

i CHEN, S. L., AND OTHERS. 633.49-2.95
An antibiotic substance in the Chinese water-chestnut, *Eleocharis tuberosa*.
Nature, 1945, **156**: 234, bibl. 2.

j GLASS, E. H. 632.752
Feeding habits of two mealybugs, *Pseudococcus comstocki* Kuw.) and *Phenacoccus colemani* (Ehrh.).
Tech. Bull. Va agric. Exp. Stat. **95,** 1944, pp. 16, bibl. 7.

k GUNTHER, F. A., AND TURRELL, F. M. 632.951
The location and state of rotenone in the root of *Derris elliptica*.
J. agric. Res., 1945, **71**: 61-79, bibl. 42, being *Pap. Citrus Exp. Stat. Riverside* **624.**

l HARVEY, W. A. 632.5
Weed problems and weed control in the Yakima Valley.
Bull. Wash. agric. Exp. Stat. **448,** 1944, pp. 32.
Not orchard weeds.

m HOUGH, W. S. 632.782
Development and characteristics of vigorous or resistant strains of codling moth.
Tech. Bull. Va agric. Exp. Stat. **91,** 1943, pp. 32, bibl. 20.

n HURT, R. H. 634.8-2.3/9
Control of grape diseases and insects.
Bull. Va agric. Exp. Stat. **332,** 1941, pp. 12, bibl. 4.

o ISELY, D. 634.8-2.76
The grape rootworm [*Fidia viticida*].
Bull. Ark. agric. Exp. Stat. **426,** 1942, pp. 26, bibl. 15.

p JONES, H. A., FLUNO, H. J., AND HENDRICK, A. B. 632.951
DDT insecticidal preparations.
J. econ. Ent., 1945, pp. 207-10.

q JONES, M. A. 632.951
Application of a modified red-color test for rotenone and related compounds to *Derris* and *Lonchocarpus*.
J. Ass. off. agric. Chem. Wash., 1945, **28**: 352-9, bibl. 6.

r MEAD, H. W. 581.142: 632.4
A biological method of detecting the presence of fungicides on seeds.
Sci. Agric., 1945, **25**: 458-60.

s PHILLIPS, A. M. 634.521-2.78
Control of the pecan nut casebearer and leaf casebearer (*Acrobasis caryae* and *A. juglandis*).
Pr. Bull. Fla agric. Exp. Stat. **591,** 1943, pp. 4.

t POTTS, W. H., AND VANDERPLANK, F. L. 632.951
Mode of entry of contact insecticides [D.D.T.].
Nature, 1945, **156**: 112, bibl. 4.

u POWNING, R. F. 632.951
The analysis of D.D.T. and pyrethrins in kerosene-based [mixed insecticide] sprays.
J. Coun. Sci. industr. Res. Aust., 1945, **18**: 121-3, bibl. 3.

v PRILL, E. A., HARTZELL, A., AND ARTHUR, J. M. 632.951
Insecticidal activity of some alkoxy analogs of DDT.
Science, 1945, **101**: 464-5, bibl. 7.

w REED, G. M. 632.3/4 + 632.8
Phytopathology—1867-1942.
Reprint from *Torreya*, 1943, **43**: 155-69, being *Contr. Brooklyn bot. Garden* **99.**

x STEVENSON, E. C., AND MITCHELL, J. W. 632.3
Bacteriostatic and bactericidal properties of 2,4-dichlorophenoxyacetic acid.
Science, 1945, **101**: 642-4, bibl. 4.

y WEHNELT, R. 632.1/9(43)
***Die Pflanzenpathologie der deutschen Romantik*. (German plant pathology during the first half of the 19th century.)**
Bonner Univ. Druckerei, Bonn, 1943, pp. 237, from review *Forschungsdienst*, 1944, Vol. 17, abstr. p. 36.

z WHEELER, E. H. 634.14-2.754
DDT to control *Glossonotus crataegi* [quince tree hopper].
J. econ. Ent., 1945, **38**: 274.
It does so.

1659.

a WHITE, P. R. 632.314
Metastatic (graft) tumors of bacteria-free crown-galls on *Vinca rosea*.
Amer. J. Bot., 1945, **32**: 237-41, bibl. 10.

b WORMALD, H. 634.75-2.4
Strawberry leaf blotch fungus.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 76-7.
Reprint of a paper already noted (*H.A.*, 15: 101.)

c WORMALD, H. 634.11-2.4
A black apple rot caused by *Monilia cinerea*.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 75-6.
Reprint of paper already noted (*H.A.*, 15: 562).

d WORMALD, H., AND MOORE, M. H. 634.11-2.4
The control of brown rot of apples in commercial orchards.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 124-6.
Reprint of a paper already noted (*H.A.*, 15: 1032).

VEGETABLE, DRUG AND OTHER PLANTS.

1660. DAWE, C. V. 635.1/7(42)
Vegetable production on the farm.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 210-2.
Alone of 18 vegetable crops listed only two, namely asparagus and rhubarb, showed smaller acreages in the United Kingdom in 1944 than in 1939. The tomato acreage has increased nearly 10 times, onions by 414%, parsnips by 212% above the pre-war average, and these are followed closely by turnips and swedes, lettuce, beetroot and cabbage.

1661. COSTE, A. 635.1/7(65)
Cultivons des légumes d'été. **(Summer vegetable growing in Algeria.)**
Bull. Inspect. gén. Agric. algér. **68,** 1942, pp. 8.
The instructions given for the growing of summer vegetables under irrigation in Algeria relate to the following kinds:—Potato, carrot, tomato, eggplant, sweet pepper, gourd and pumpkin, melon, bean, onion and leek.

1662. ANON. 63(65)
Orientation à donner à la production agricole algérienne pour la campagne 1944-1945. **(Plan of proposed agricultural production in Algeria 1944-5.)**
Bull. Inspect. gén. Agric. algér. **107,** 1944, pp. 12.
The plan includes beans, peas, lentils, market garden crops, tobacco, wine and fruits.

1663. ANDERSEN, E. M., AND OTHERS. 635.1/7(75.9)
Commercial vegetable varieties for Florida.
Bull. Fla agric. Exp. Stat. **405,** 1944, pp. 30.
The bulletin is the first of a series which will report the results of vegetable variety trials conducted on a state-wide scale by the Florida Agricultural Experiment Station and designed to be of use mainly to commercial growers. In a table, the varieties of the major kinds of vegetables are listed under 3 heads: Recommended, promising, not recommended. The varieties falling under the first two groups are then given a more detailed description.

1664. BRIFFA, J. 635.1/7(45.8)
Vegetables and herbs [in Malta].
Leafls. Malta hort. Soc. **1-15,** undated, pp. 3 or 4 each.
Leaflets No. 1-12 are devoted to cultivation methods of the more common vegetables in Malta as well as to instructions on seed saving and cropping the garden. Leaflets No. 13 and 14 deal with herb growing and No. 15 with household recipes for preserving tomatoes.

1665. HERBST, W. 635.1/7: 631.544
Zur Verstärkung des Anbaus von Frühgemüse. **(The intensification of early vegetable growing in western Europe.)**
Forschungsdienst, 1944, **17**: 362-9, bibl. 10.
On the basis of meteorological data it is shown that certain parts of Alsace as well as certain areas of south-western Germany and other large parts of France are well suited to early vegetable growing in the open. The cultivation of early vegetables in these climatically favourable areas would make a valuable contribution to Europe's needs.

1666. ČEREMNYH, D. 635.1/7: 631.544
Early vegetables in Siberia. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 3, pp. 17-8.
The south-west region of Western Siberia has a late spring and early autumn, the period without frost averaging 117 days, and the cultivation in the open of such crops as tomatoes and cucumbers, which are very sensitive to low temperatures, offers special difficulties. The author, however, shows that by modification of ordinary methods these crops can be matured in the open ground.

1667. KNOWLES, D., GROTTODDEN, O., AND LONG, T. E. 664.84.037
Freezing vegetables.
Bull. N. Dak. agric. Exp. Stat. **322,** 1943, pp. 22, bibl. 33.
The comparative suitability of varieties of green beans, lima beans, wax beans, maize and peas for freezing preservation is discussed.

1668. FROLOV, I. 631.531: 635.1/7
Experiments at the State farm Lesnoï. [Russian.]
Sovhoznoe Proizvodstvo (State farming), 1944, Nos. 8-9, pp. 29-30.
The article describes the results of variety trials in which potatoes, tomatoes, carrots, table beet, onions, and other vegetable crops were investigated. Seed production was the subject of enquiry as regards carrots and beet. Plants grown from carrot crowns were made to produce seed, the yield of which was equal to that of seed grown in the normal way. Varieties are being improved by means of selection. The soaking of beet seed before sowing doubled the yield of roots. The quality of tobacco seed of the varieties Tyn-Kulas and Dubec was improved by breaking off up to 50% of the seed formed towards the latter part of the season.

1669. ARRÓNIZ, C. 581.162.3: 635.1/7
Manera de realizarse la fecundación de las flores de algunas plantas horticolas autógamas. **(Manner of effecting fertilization of the flowers of certain autogamous horticultural plants.)**
Bol. Inst. nac. Invest. agron. Madrid, 1943, No. 9, pp. 129-47, bibl. 23.
The author studied the pollination of the flowers of chillies (*Capsicum annuum*), egg-plant (*Solanum melongena*), lettuce (*Lactuca sativa*) and tomato (*Lycopersicum esculentum*). He finds that there is self-pollination in the first three, and sometimes also in the fourth, but there is always the risk of cross-pollination when different varieties are grown close to each other, because their flowers are visited by insects. Lettuce is the least liable to cross-pollination because of the short time which it needs for pollination.

1670. KOVALEVSKAJA, P. Ja. 581.162.3
Overcoming the injurious influence of self-pollination in plants normally cross-pollinated. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 7, pp. 21-5.
The author concludes that self-pollination in breeding plants that are normally cross-pollinated can only succeed when based on an accurate knowledge of the causes of failure. The injurious influence of self-pollination can be obviated by ensuring favourable conditions of nutrition during the development of the various sexual cells of the plant.

1671. THOMAS, P. H. 635.1/7: 631.531
The harvesting, threshing and cleaning of vegetable seeds.
Tasm. J. Agric., 1944, **15**: 10-4.
Following an appeal to Tasmanian growers to go in for vegetable seed production the process of seed harvesting, threshing and cleaning is discussed both in principle and in greater detail for individual crops of red and silver beet; cabbage, cauliflower, swede and turnip; carrot; parsnip; onion and leek; and radish.

1672. GILES, J. E. 635.1/7: 631.531
Investigations into production of vegetables and vegetable seeds in the Red Cliffs district.
J. Coun. sci. industr. Res. Aust., 1945, **18**: 124-32.
Results are based on monthly experimental sowings from 28 April 1942 to 26 March 1943, of carrots, parsnips, red

beet and onions. The chief results were as follows:—sowings of carrots (Chantenay) from the end of August to the end of January were suitable for both root and seed production, other dates not so good. All sowings of parsnips (Hollow Crown) other than February and March produced good roots and seeds. As regards red beet (Crimson Globe), whereas sowings between late July and late November gave the quickest production of marketable roots, January to June sowings were best for seed production. Onions (White Spanish) from seed sown during the summer, i.e. November to March, failed to produce bulbs of marketable size. Satisfactory bulbs were formed when seed was sown from April to October and good seed crops were obtained from sowing any time in the year except March.

1673. MINISTRY OF AGRICULTURE, LONDON. 631.531.14: 635.1/7
Threshing of grass, root and vegetable seed crops.
Bull. Minist. Agric. Lond. **130,** 1945, pp. 20, 9d.

Detailed diagrams are given of a corn threshing machine and of a clover huller and most of the bulletin concerns the threshing of grass and clover seed. The threshing of vegetable and root crops is considered on pp. 16-20. A variety of smaller threshers can be used for these, and recently a machine manufactured for the shelling of maize, driven by a 10 h.p. engine, has been used for leeks, onions, carrots, runner beans and haricots and a brief description of the process involved is given. Alternatively the corn thresher, huller or combine can be used for the purpose and detailed suggestions are here made as to drum setting, size of screens and general adjustment of the corn thresher necessary for the threshing of particular vegetable and root crop seeds. Notes are also made on seed dressing.

1674. ZYKOV, D. 631.584(47)
The cultivation of catch crops in Central Asia. [Russian.]
Sovhoznoe Proizvodstvo (State farming), 1944, No. 7, pp. 31-3.

In those parts of Central Asia where some crops are harvested by the first half of July, an additional 90 to 120 warm days remain during which an early-maturing, short-day crop could be grown. Among the crops suggested for this purpose are suitable varieties of rice, maize, sorgo, millet, African millet, buckwheat, Sudan grass, *Setaria italica*, oat-and-vetch, barley-and-vetch mixtures, grain, haricot beans, soya beans, peas, early potatoes, sugar beet, sunflower and safflower. These crops have to be sown in dry hot weather which lasts during the germination and seedling stages. The article therefore devotes some attention to experiments which have been carried out in order that means may be found of overcoming the difficulties involved.

1675. HALL, E. G. 635.1/7: 658.8
Notes on the marketing of perishable vegetables.
Agric. Gaz. N.S.W., 1945, **56**: 58-62, 107-11, 145-7, 150, 201-4.

In discussing the general causes of the serious deterioration of vegetables during marketing, which sometimes occurs in New South Wales, such factors as maturity of the crops, grading, containers and transport conditions are dealt with. Improved methods of handling and packing the produce, which may lead to a better quality product for the consumer and higher returns to the grower, are suggested. The particular vegetables dealt with are: beans, beetroot, sprouting broccoli, brussels sprouts, cabbage, cauliflower, celery, cucumber, lettuce, peas, rhubarb, silver beet, tomatoes and rock melons.

1676. HEWITT, E. J. 635.1/7: 631.8
Placement experiments in the use of fertilisers. Progress report, 1944.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 75-9, bibl. 4.

1. Experimental plots, conforming to statistical requirements, were laid down to test the relative effects of liquid starter and top dressing solutions as compared with solid broadcast applications of fertilizer. 2. Transplanted crops, including tomatoes and cauliflowers, benefited significantly from liquid treatments both in earliness and total yields. 3. Tomatoes responded particularly well when the starter solution was given to the plants in boxes five days before planting out. 4. Seeded crops were delayed in emergence by liquid treatments; peas showed a significant increase of yield with liquid treatments, while for beets broadcast applications generally gave the highest yields. [Author's summary.]

1677. PICKFORD, P. T. H. 635.11: 631.8
Manurial experiments on vegetable crops. VII. Effects of farmyard manure and of various fertilizer treatments on garden beet.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 71-3, bibl. 3.

Results with only one variety (Detroit) out of 4 garden beets significantly confirmed the importance of a complete manurial treatment for beet. Omission of either phosphate, potash or nitrogen adversely affected the yield of Detroit.

1678. WENDT, H. 635.1/7: 631.8: 613.2
Gesundheitliche Wirkungen verschiedener Gemüsedüngung. **(The effect on health of treating vegetables with organic and organic plus artificial fertilizers.)**
Ernährung, 1944 (?), Bd. **8,** H.12, from abstract *Forschungsdienst*, 1944, **17**: 620-1.

Boys of 14-17 living in two hostels at Munich were given vegetables treated with stable manure only and with stable manure plus NPK respectively over a period of 4 years. Very thorough medical observation did not reveal any differential effect on health of the two treatments.

1679. WITTWER, S. H., SCHROEDER, R. A., AND ALBRECHT, W. A. 631.84: 577.16
Vegetable crops in relation to soil fertility. II. Vitamin C and nitrogen fertilizers.
Soil Sci., 1945, **59**: 329-36, bibl. 36, being *Mo. Coll. Agric. J. Ser.* **967**.

A careful review of the literature indicates that a high rather than a low vitamin C concentration in plants is associated with a reduction in yield due to nutrient deficiencies, particularly nitrogen. Since certain minerals and ascorbic acid play similar roles as catalysts in plant metabolism, it is suggested that the increase in vitamin C may be a secondary mechanism of the plant to overcome unfavorable conditions of mineral nutrition. Evidence is presented which indicates that the concentration of vitamin C in leafy green vegetables increases as the fertility of the soil with respect to nitrogen decreases. [From authors' summary.]

1680. GERICKE, S. 635.1/8: 631.85
Phosphorsäuredüngung im Gemüsebau. **(Phosphoric acid manuring in vegetable growing.)**
Leistungssteigerung Gartenb. **8,** 1944, pp. 108, from review *Forschungsdienst*, 1944, Vol. **17,** abstr. p. 42.

On the basis of large-scale trials an annual application of 160 kg. P_2O_5 per hectare is recommended for intensive vegetable growing.

1681. POPOV, I. P. 635.1/7: 631.8
Intermittent manuring of vegetables as a method of obtaining increased yields. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 6, pp. 21-3.

The author describes experiments in which increased yields were obtained with cucumbers, tomatoes, potatoes, early cabbages, carrots and beetroot, by applying fertilizers at intervals during the growing period.

1682. Skripničenko, L. A. 635.1/7: 631.85
Green manuring for vegetable culture. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 5, pp. 10-15.
The author states that experiments in White Russia have shown that, in growing vegetables, high yields can be obtained by green manuring, together with the application of phosphoric and potassic inorganic fertilizers and lime, without dung or other organic manures. The results are shown graphically.

1683. Roach, W. A. 634/635-2.19: 581.111
Mineral deficiencies* in agricultural and horticultural crops.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 43-60, bibl. 16.
Leaf analysis and leaf injection have been used on agricultural and horticultural crops during the war for the diagnosis of mineral deficiencies, the effect of which on yield have been measured by experiments carried out under practical conditions in the field. Widespread partial and complete failures in potatoes on freshly ploughed derelict land were shown by these two methods to be associated everywhere with calcium deficiency and in most places with magnesium deficiency also, though neither could be diagnosed by leaf symptoms. Making good the deficiency led to an increase of crop in 1943 of 3,000 tons on these derelict lands alone. Manganese deficiency was diagnosed in wheat that showed no symptoms and spraying increased the yield to an economically important amount. The yield of early potatoes, showing no symptoms, but in which manganese deficiency was diagnosed by leaf injection, was increased from 4 to 5 tons per acre. These results prove that at least one trace element deficiency may reduce the yield of a crop to an economically serious extent without showing any specific symptom, as has long been known to be true of deficiencies of the major elements. Widespread and severe deficiencies of potassium and one or more of the trace elements, iron and magnesium, were diagnosed in apples. Deficiencies diagnosed in cherries included a multiple one of manganese, iron and zinc, all three of which had to be injected to produce a complete cure. [Author's summary.]

1684. Hewitt, E. J. 632.19
Experiments in mineral nutrition. II. The visual symptoms of mineral deficiencies in crop plants grown in sand cultures. Progress Report 1944.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 50-60, bibl. 3.
1. The survey of visual symptoms of mineral deficiencies was continued with 28 crops grown in controlled nutrient deficiency sand cultures. 2. The technique for studying trace element deficiencies of crops grown on a large scale was extended by the development of a method for obtaining washed sand in large quantities, using steam and 7-10% HCl. 3. With the rain-water and distilled water technique the following deficiency symptoms were observed:—Nitrogen, phosphorus, potassium, magnesium in barley, carrot, parsnip, dwarf bean, runner bean, pea, red clover, alsike, lucerne, potato. Nitrogen, phosphorus, potassium in wheat and oats. Potassium in rye, tomato. Calcium in cabbage, cauliflower, marrowstem kale, seakale, beet, pea, alsike clover, flax, tomato, potato. Magnesium in marrowstem kale, swede, seakale beet, garden beet, tomato. Iron in marrowstem kale, parsnip, red clover, flax, tomato, potato. Manganese in marrowstem kale, parsnip, broad bean, dwarf bean, runner bean, pea, flax, tomato, potato, and symptoms resembling "Marsh Spot" were observed in broad and runner beans. Boron in cauliflower, rape, hungry gap kale, carrot, celery, mangold, garden beet, broad bean, red clover, lucerne, flax, tomato. 4. Most nutrient salts contained sufficient boron and iron to prevent the production of severe deficiency symptoms in some crops. Considerable amounts of boron and calcium and some potassium and magnesium could also be leached from the pottery. [Author's summary.]

* See also 1383, 1544-52.

1685. Lal, B. N. 632.19: 581.111
Plant-injection methods for the diagnosis of mineral deficiencies in tobacco and soya bean.
Ann. Bot. Lond., 1945, **9**: 283-95, bibl. 3.
The leaf-stalk and the interveinal methods of injection were found to be most suitable for diagnosing mineral deficiencies in tobacco and soybean respectively. The distribution in the plant of injected dye solutions is illustrated by diagrams, while photographs show the responses to treatment by injection.—East Malling Research Station.

1686. Roach, W. A., and Hoblyn, T. N. 633.416-2.19: 546.711
Comparison of diagnosis of manganese deficiency in mangolds with effects of curative spraying.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 67-70.
Yields were measured from strip plots of mangolds, some sprayed with 1% solution of manganese sulphate, others left unsprayed, on areas that had shown differing degrees of severity of manganese deficiency as indicated by the leaf symptoms. On the unsprayed plots the yield was highest where the symptoms were most severe. The spraying produced the largest increase in crop on the mangolds showing the least severe symptoms.

1687. Garner, R. J., and Roach, W. A. 633/635: 631.811.9
Comparative susceptibilities of certain horticultural and agricultural plants to trace element deficiencies.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 70-3.
Thirteen different kinds of plants were grown on a highly calcareous peat to study their relative susceptibility to trace element deficiencies. They differed markedly in susceptibility both quantitatively and qualitatively. Oats and peas were the most highly susceptible to manganese deficiency, and barley, potatoes and mangolds slightly less so. Willows were highly susceptible to iron deficiency. The symptoms shown by willows were those looked on as typical of manganese deficiency in fruit trees. Boysenberry showed symptoms looked on as characteristic of iron deficiency in fruit trees, but was proved to be affected by manganese deficiency. There was an inverse relationship between severity of symptoms and crop in potatoes, oats, peas and willows. [Authors' summary.]

1688. von Berenberg-Gossler, G. 632.19: 546.711
Versuche über Manganmangel an verschiedenen Kulturpflanzen. **(Manganese deficiency trials with cultivated plants.**
Thesis Bonn Univ., 1943, pp. 68, from review *Forschungsdienst*, 1944, Vol. **17,** abst. p. 31.
The plants investigated included peas, beans, broad beans, soybeans, cucumbers and tomatoes, as well as a number of agricultural plants. The clearly described and illustrated manganese deficiency symptoms (41 illustrations) may be summarized as follows: Imperfect formation of chlorophyll, light to whitish-green leaf colour—only the leaf veins and a narrow stripe of parenchyma around them show a darker green—, brown to white spots on the leaves; poor development of shoot and roots, the latter being described as "starvation roots" (Hungerwurzeln) with many small lateral roots. The expression of deficiency symptoms is favoured by an alkaline nutrient solution. No confirmation could as yet be obtained of a relation between the K: Ca ratio and manganese deficiency, reported as existing by Lündegardh. Manganese deficiency in the plants is not always caused by manganese deficiency in the soil. Probably

the oxygen content of the soil plays a certain part, since deficiency symptoms generally occur in well aerated soils, where manganese salts may be oxidized to compounds of higher valency, which are not fit for utilization by plants. Again, the more alkaline the soil reaction, the more severe are the symptoms, and hence the application of physiologically acid fertilizers has a curative effect. Manganese moves with relative difficulty in the plant. Only a very small portion of the manganese deposited in older leaves is transported to the younger ones. A surplus of manganese may cause brown spots on the leaves.

1689. Davies, E. B. 635.35: 632.19: 547.25.77
A case of molybdenum deficiency in New Zealand.
Nature, 1945, **156**: 392-3, bibl. 13.

In a small-scale investigation cauliflower plants not treated with manganese, zinc, copper and molybdenum showed extreme symptoms of "whiptail". While it could not be proved that trace element deficiency was the only cause of the trouble, it was found in further studies in the greenhouse and *in situ* that severe chlorosis occurred on that particular soil in plants which had not received molybdenum, the symptoms being aggravated in the absence of lime. Plants treated with molybdenum were dark green and vigorous. This is the first instance of molybdenum deficiency demonstrated in New Zealand.

1690. Spurway, C. H., and Wildon, C. E. 631.544: 631.415
Controlling the reaction (pH) of greenhouse soils.
Quart. Bull. Mich. agric. Exp. Stat., 1943, **26**: 115-21.

The effect of fertilizers and certain chemicals on the pH of greenhouse soils watered with hard and soft water.

1691. Heath, O. V. S., and Whitcher, E. J. 631.544.5
A simple automatic window-opening device for temperature control in greenhouses.
Ann. appl. Biol., 1945, **32**: 173-6.

The apparatus described opens greenhouse windows within 2 min. of the closing of a thermostatically controlled electric circuit, and shuts them with a time lag of 12 min. after the circuit is broken. Power is consumed, during the time that the circuit is closed only, at about 250 W.; the apparatus can readily be extended to operate more windows or other similar devices and is easily adaptable to existing greenhouses. [Authors' summary.]

1692. Cavzdari, E. E. 632.77: 631.544
A pest of greenhouse and conservatory plants—the white fly and its control. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 7, pp. 26-9.

In recent years the white fly, *Aleurodes* [*Trialeurodes*] *vaporariorum*, has been causing damage on tobacco and tomato plants under glass, in the Leningrad and Moscow areas. The insect, its life history, the damage it causes, and the usual methods of control, are described.

1693. Withrow, R. B., Biebel, J. P., and Eastwood, T. M. 663.61: 631.589
Nutrient solution culture of greenhouse crops.
Circ. Ind. agric. Exp. Stat. **277**, 1943, pp. 27, bibl. 16.

The methods of free solution, sand and sub-irrigation culture are described, and their respective merits and disadvantages are set out. Other subjects discussed are: Chemical sterilization, application of insecticidal and fungicidal sprays (which are injurious to the roots), nutrient solutions (composition, pH, temperature, etc.), hardening for transplanting (by salt application) and nutrient solution testing. Six tables provide the necessary data on nutrient solution formulae, micro-element supplement, etc.

1694. Balandin, F. V. 635.1/7: 631.67
An experiment in irrigating vegetables in the Leningrad province. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 4, pp. 25-7.

Describes experiments on the irrigation of onions, beetroot, tomatoes and carrots; the increase in crop yields is given in tables.

1695. Ogilvie, L. 635.1/7: 632.3/4+632.8
Diseases of vegetables.
Bull. Minist. Agric. Lond. **123**, 1944, pp. 74, 1s. 6d.

This bulletin has a wide appeal as shown by the fact that since the first edition appeared in 1941 (*H.A.*, 1941, 11: 1210) it has had to be reprinted in May 1942, October 1942, and July 1943. The present edition follows the first closely, but the general interest in home-grown vegetables during the war years has resulted in increased knowledge of their cultivation and diseases, and such information on the diseases is incorporated in this edition. In a number of the diseases the descriptions of control measures or of symptoms have been expanded to bring them more up to date; this is particularly noticeable in diseases of the tomato, a crop grown on an increased scale both under glass and in the open in recent years. Other diseases mentioned which are not included in the 1941 edition are: splitting and clayburn of carrots (p. 14), shanking in onions and shallots (p. 24), celery mosaic (p. 34), cucumber mosaic affecting outdoor tomatoes (p. 55), and bacterial canker of tomato (p. 59). Mineral deficiency troubles and balanced manuring receive more emphasis. Although the urge for the intensive cultivation of vegetables is passing, the interest in kitchen garden and market garden crops remains, and the need for keeping such crops in the best of health and productiveness will be met, if the measures advocated in this bulletin are followed.

1696. Jacks, H. 631.462
Soil disinfection. II. Preliminary report on control of damping-off.
N.Z. J. Sci. Tech., 1945, **26**, Sec. A, pp. 357-8, bibl. 2.

Certain chemicals were compared in respect of their value for controlling damping off in tomatoes (*Pythium ultimum*) and nematodes in New Zealand. Chloropicrin, applied by two different methods, was found to serve the dual purpose very well, while DD (dichloropropane-dichloropropylene), which had previously proved successful against nematodes, gave contradictory results with *Pythium* and is under further investigation.

1697. Smith, F. F., Ditman, L. P., and Goodhue, L. D. 632.951: 635.1/7
Experiments with aerosols against some pests of truck crops.
J. econ. Ent.; 1945, **38**: 189-96, bibl. 2.

DDT aerosols were found toxic to 31 species of insect attacking vegetable crops or their predators. Among resistant species were the harlequin cabbage bug, the squash bug, the Mexican bean beetle, coccinellid adults and larvae and syrphid larvae. Nicotine and derris aerosols were much less effective. 5% DDT efficiently applied was practically as effective as 10%. The heavier aerosols producing larger droplets were superior to the lighter ones. There was extremely little plant injury.

1698. Goodhue, L. D., and Smith, F. F. 632.951: 635.1/7
DDT in aerosol form to control insects on vegetables.
J. econ. Ent., 1945, **38**: 179-82, bibl. 4.

Highly successful results are reported on vegetable insects. The method would appear to be very practical for truck gardeners, since a large area can be treated easily and effectively with a light hand-drawn machine.

1699. COTTIER, W., AND JACKS, H. 632.78
Relative efficiencies of nicotine sulphate and certain arsenates for control of diamond-back moth.
N.Z. J. Sci. Tech., 1945, **27**, Sec. A, pp. 37-9.
Nicotine sulphate at concentrations of 0·5% and 0·25% proved superior in the control of the diamond-back moth (*Plutella maculipennis*) to either lead or calcium arsenate at concentrations up to 4 lb. per 100 gal. water. The cabbage plants suffered spray damage from applications of calcium arsenate at all concentrations and of lead arsenate at 4 lb. per 100 gal. A suitable strength of nicotine sulphate for commercial conditions remains to be worked out.

1700. GRIGSBY, B. H., AND BARRONS, K. C. 632.954
Some new ideas in weed control.*
Quart. Bull. Mich. agric. Exp. Stat., 1945, **27**: 301-12.
Although the preliminary trials reported in this paper do not justify the definite recommendation of new methods in weed control, commercial growers are advised, particularly in view of the acute labour shortage, to test the experimental results, obtained in Michigan and elsewhere, on a limited scale. The treatments suggested are of two kinds: (1) *Pre-emergence treatments*; (*a*) burning, which was successful with onions and asparagus crowns grown from seed, (*b*) spraying 2% sulphuric acid plus spreader at the rate of 100-150 gallons per acre. 1% Sinox with sulphate of ammonium added and G-320 at a dilution of 1: 1,000 are named as substitutes, if equipment for applying acid is lacking. A combination of pre-emergence burning and sulphuric acid spray is recommended for crops, the seeds of which germinate slowly. (2) *Selective sprays*, which should be applied on bright warm days immediately after a rain; (*a*) 2% sulphuric acid without spreader, effective with onions if applied 3 weeks after emergence and again 2 weeks later at the rate of 100 gallons (rows only) or 150 gallons (entire surface) per acre. This may be applied under conditions not favourable for the other chemicals. (*b*) 1% Sinox (without ammonium sulphate) at the rate of 100 gallons per acre, applied to onions 3 weeks after emergence, causes some reduction in stand and involves a certain amount of risk; should be tested on a small area first. (*c*) G-320 kills small weeds in onions; ¾ lb. in 100 gallons per acre. (*d*) Sovasol No. 5 or a mixture of Sovasol No. 75 with white kerosene (1 part to 2 parts of kerosene) has been recommended by the Massachusetts Agricultural Research Station for weed control in carrots and parsnips. Kerosene and other petroleum products had proved unsatisfactory for the purpose in the Michigan trials.

1701. GRIGSBY, B. H. 632.954
The inhibition of pollen production in ragweed by the use of chemical sprays.
Science, 1945, **102**: 99-100, being *J. Art. Mich. agric. Exp. Stat.* 755 (n.s.).
Physicians working in the field of pollen allergy have been trying to prevent the flower formation of ragweed by means of chemical sprays. Compounds were found which will kill the weed but have the disadvantage of not being selective. It is suggested that further work with "2-4-D", which was shown to stop the terminal growth of ragweed plants, 6 in. tall, may lead to a solution of the problem.

1702. MARTH, P. C., AND DAVIS, F. F. 632.954
Relation of temperature to the selective herbicidal effects of 2,4-dichlorophenoxyacetic acid.
Bot. Gaz., 1945, **106**: 463-72, bibl. 9.
Spraying with 2,4-dichlorophenoxyacetic acid at 500, 1000 and 1500 p.p.m. and with its sodium and ammonium salts at 1000 p.p.m. was found to kill a number of specified weeds growing in pots and kept in the greenhouse at temperatures of 65°-75° F. and 75°-90° F. within 18-21 days. At a temperature of 50°-60° F. the time required to kill the plants was extended to 29-36 days, while 32°-40° proved too low for the chemical to be effective. On removal from sub-freezing temperatures to the higher temperature ranges in the greenhouse 6-8 weeks after treatment the plants died rather quickly.

* See also 1654, 1655.

1703. RAPHAEL, T. D. 632.954: 635.13+635.14
Notes on the use of selective oil sprays for the control of weeds amongst seedling carrots and parsnips.
Tasm. J. Agric., 1944, **15**: 125-6.
Small-scale trials of commercial power kerosene of tested quality for weed control in seedling carrots and parsnips were carried out for 2 seasons at Summerleas and Margate, Tasmania. With applications at the rate of 17 and 26 gal. per acre for carrot rows 3 ft. apart, i.e. approximately 30% and 100% respectively above the recommended standard rate, a complete weed kill was achieved without apparent injury to the crop. In parsnips good weed control was associated with damage to seedlings in the three-leaf stage and with severe injury in later stages.

1704. ANON. 632.954
Control of wild onion or scented garlic *(Nothoscordum fragrans)*.
Agric. Gaz. N.S.W., 1945, **56**: 401.
So far, no weed killer has proved effective against the wild onion or scented garlic, which infests garden areas in Sydney and many other high rainfall districts of New South Wales. The only means of destroying this troublesome weed is to dig it up during the period June-September.

1705. LIGON, L. L. 633.379
Mungbeans, a legume for seed and forage production.
Bull. Okla. agric. Exp. Stat. **284**, 1945, pp. 12.
The mungbean, *Phaseolus aureus*, is attracting considerable attention in Oklahoma because of its food and forage value. No other crop, it is claimed, can be grown with so little trouble and few other crops can be planted following small grains to give so profitable a return. The mungbean is a native of southern Asia, but it is well suited by the climatic and soil conditions prevailing in Oklahoma, the largest mungbean-producing state in America. Sprouted seed is especially esteemed by the Chinese community in the States, but the significance of the crop for soil improvement, hay, silage, and pasture is also emphasized. The golden type of mungbean varieties is generally grown for feeding purposes, while the green type is planted for seed. Seed yield of green varieties, in tests carried out at the Oklahoma Experiment Station, amounted to 720-900 lb. per acre. Selection No. 12 is the variety most widely used for multiplication and distribution in the State. The cultivation of the crop and its harvesting are described.

1706. POLLARD, A., AND OTHERS. 633.491
Factors affecting quality in potatoes.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 184-99, bibl. 2.
Soil proved all important and, given good soil, quality, with special reference to blackening on cooking, was little affected by manurial treatment other than by actual deficiencies which had arisen or been induced. In such cases K deficiency was associated with increased blackening, and P deficiency caused deterioration in flesh consistency and flavour. Varieties differed greatly in tendency to blackening. Adverse effects were noted from late planting.

1707. BARDIA BARDIA, R., AND VALLE ARRIBAS, J. 633.491-2.76-2.96
Un enemigo del escarabajo de la patata observado en Ametlla del Vallés (Barcelona). **(An enemy of the Colorado beetle of potato observed in Ametlla del Vallés (Barcelona).)**
Anal. Esc. Agric., Barcelona, 1943, **3**: 25-9.
After mentioning four chief parasitic or predatory insects of the Colorado beetle the authors describe their own

observations on *Licrona coerulea* (L.), a predatory insect which attacks the adult beetle and also the larvae in various stages.

1708. MELHUS, I. E. 633.491-2.411
Late blight forecasting service.
Phytopathology, 1945, **35**: 463-479.
Given the weekly temperature and rainfall of the potato growing areas and assuming that sources of inoculum exist near the potato fields, one can rather accurately predict the prevalence and destructiveness of the late blight pathogen throughout the growing season.

1709. MIÈGE, E. 633.5(646)
Les plantes textiles au Maroc. **(The cultivation of fibre plants in Morocco.)**
Fruits et Primeurs, 1942, **12**: 124: 85-6 (cotton), 129: 211-2 (ramie), 130: 230-1 (hemp), 1943, **13**: 132: 8-9 (flax), 133: 32-3 (malvaceae), 134: 47-9 (cotton), 135: 79-80 (agave), 136: 100-1 (*Stipa tenax*), 137: 118-9 (dwarf palm [*Chamaerops humilis*]), 138: 141 (kapok), 139: 157-8 (Spanish broom [*Spartium junceum*] and mulberry), 140: 168 (*Urena*), 141: 181-2 (*Musa* spp.), 142: 205-6 (bamboos, canes, etc.), 1944, **14**:143: 13-4, 144: 31-2 and 145: 60-1 (indigenous fibres).
In these short articles the author discusses the types of different fibre plants in cultivation in Morocco and their methods of cultivation. He also gives notes on processing.

1710. ANGELL, H. R. 633.52-2.4 + 1.432
Browning of flax and excess soil moisture.
J. Coun. sci. industr. Res. Aust., 1945, **18**: 150-2, bibl. 3.
Browning of flax is of minor importance in Australia. Trials show some indication that it is connected with excessive moisture.

1711. MILLIKAN, C. R. 633.52-2.4
***Phoma* stem disease of flax.**
J. Aust. Inst. agric. Sci., 1944, **10**: 129-30, bibl. 6.
A severe type of stem spotting observed on some plants of a Concurrent flax crop at Leongatha, Victoria, was shown to be due to a *Phoma* species, although the symptoms differed from those usually caused by species of the *Phoma* genus.

1712. MILLIKAN, C. R. 633.52-2.48
Wilt disease of flax.
J. Dep. Agric. Vict., 1945, **43**: 305-13, 354-61, bibl. 33.
From October onwards severe wilt of flax, caused by *Fusarium oxysporum* f. *lini*, has been prevalent lately in the Drouin district of Victoria on land which had been over-cropped with flax. The symptoms of the disease are described. Experiments were conducted at Burnley and Drouin to study (1) the effect of soil temperature on flax wilt and (2) varietal resistance to the pathogen. (1) The soil temperature range shown to be favourable to the development of the fungus was found to obtain from October to April under Victorian conditions. Susceptible plants grown in naturally infected soil became wilted at any time up to at least 20 weeks from germination, as soon as the soil temperature reached 75° F. (2) The wilt resistance of numerous flax varieties was tested under severe conditions, viz. in plants growing in naturally infected soil in tanks with a constant temperature of 75° F. The following varieties, two of which have already proved highly resistant under field conditions, were selected for their superior wilt reaction in the temperature tank: Liral Crown, Liral Prince, Royal and J.W.S. It has been shown that several races of the wilt fungus exist. Flax varieties should be tested to as many of these races as possible before they are released as wilt resistant.

1713. TILT, J. 633.52-1.531.17: 581.036
Effect of temperature and time of sowing on the growth of flax in the field.
J. Aust. Inst. agric. Sci., 1945, **11**: 41-4.
The experiments were carried out at the Cressy Research Farm, Tasmania, which has a climate similar to the Midland section of the State. Sowings of Concurrent and Liral Crown, Australia's leading flax varieties, were made from March to October, yield, especially with Concurrent, declining rapidly as the season progressed from autumn to spring. The data presented in tables and diagrams suggest that length of day is an important factor and that a mean shade temperature above 45° F. is required for some weeks after sowing.

1714. PARDO, M. 633.522
Influencia de la " variedad " y " la densidad de siembra " sobre la producción de varilla de cáñamo. **(Influence of variety and density of planting on the yield of hemp straw.)**
Bol. Inst. nac. Invest. agron. Madrid, 1943, No. 9, pp. 257-75, bibl. 10.
Tests have been made during one year to find the influence of variety and of density of planting on hemp production. Five varieties have been compared: Calatayud, Fatsa, Unje, Elche de la Sierra and Tobarra. The results seem to indicate a superiority of the four last listed over the first one and also that Fatsa is better than Tobarra. Their cycles of vegetation are quite similar, which makes the Turkish hemp adaptable to Spanish climates. The tests to ascertain the influence of the density of planting for the varieties Vega baja del Segura and Tobarra show that with closer planting the diameter of the plant is reduced and the height of the plant and weight of the crop are increased, without an increase in volume of irrigation water being necessary. [Author's summary.]

1715. CHOUDHURY, S. D. 633.524.1
Sunn-hemp fibre.
Ind. Fmg, 1945, **6**: 26-7.
A description of sunn-hemp fibre extraction methods employed in Assam villages, where very high-class fibre is produced for making fishing nets.

1716. SIERRA, H. M. 633.71
Cultivo del tabaco tipo virginia. **(The cultivation of Virginian tobacco.)**
Rev. agric. Guatemala, 1945, **1**: 419-32.
A popular account of the raising, planting out and cultivation of tobacco with a brief mention of its pests. The various processes are illustrated by 41 figures reproduced from photographs.

1717. ALCARAZ MIRA, E. 633.71-2.8
Obtención de razas de tabaco resistentes al mosaico ordinario. **(Obtaining races of tobacco resistant to ordinary mosaic.)**
Bol. Inst. nac. Invest. agron. Madrid, 1944, **11**: 89-120.
Varieties of tobacco resistant to ordinary tobacco mosaic have been obtained by crossing varieties of tobacco cultivated in Spain with Nolla's resistant Ambalema variety. The technique of selection is given and the newest hybrids are described.

1718. BEARD, F. H. 633.79
Cultural trials with hops. IV. The effect of distance of planting and hard and light pulling on Brewer's Favourite.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 92-5, bibl. 2.
An account is given of a trial of the distances of planting combined with hard and light pulling on the hop variety Brewer's Favourite. Both spacing and pulling treatments influenced the yield, but spacing had, on the whole, the

greater effect. The pulling treatments caused great differences in the forwardness of the bine throughout the growing season, but caused practically no variation in the time the plants came into burr and hop. The effect of distance in this trial is compared with that obtained in earlier trials with a variety of a different habit of growth. Wide spacing combined with light pulling appears to be the most suitable method of growing Brewer's Favourite. Mention is made of the need for adjusting the distance of planting according to the vigour and habit of the variety to be grown. [Author's summary.]

1719. BEARD, F. H. 633.79(410)
Hop growing in Great Britain with special reference to research work.
Commun. Wallerstein Labs, 1945, **8**: 83-98, bibl. 32.
A brief historical survey is given of hop growing in the British Isles. This is followed by brief descriptions of past and present practices together with a review of research work. The subject is dealt with under the headings of soils, varieties, propagation, systems of wirework, distances of planting, dressing, pulling, training, stripping, cultivation, manuring, spraying, picking, drying and marketing. [Author's summary.]

1720. KEYWORTH, W. G. 633.79-2.4+2.8
Hop diseases in Great Britain.
Commun. Wallerstein Labs, 1945, **8**: 99-109, bibl. 13.
Research on hop diseases in Great Britain was started at the South-Eastern Agricultural College, Wye, Kent, and was taken up at the East Malling Research Station in 1938. Further work was begun at the Long Ashton Research Station in 1944. Of the five major diseases prevalent in Great Britain, so far two only, mould (*Sphaerotheca humuli*) and downy mildew (*Pseudoperonospora humuli*), have caused trouble in America and are well known there. More space is, therefore, devoted to the description of the 3 other important diseases, *Verticillium* wilt (*V. albo-atrum*), nettle-head and mosaic, including control measures. Among minor diseases are mentioned: canker (*Fusarium* sp.), *Armillaria* root rot (*A. mellea*) and *Phytophthora* root rot (*P. cactorum*).

1721. ELLIS, N. K., AND OTHERS. 633.822
A study of some factors affecting the yield and market value of peppermint oil.
Bull. Ind. agric. Exp. Stat. **461**, 1941, pp. 27, bibl. 13.
Forty-three per cent. of the peppermint oil produced in the United States comes from Indiana, where the crop is grown on approximately 16,000 acres, Black or English peppermint, *Mentha piperita vulgaris*, being the leading variety. It was shown that oil properties are not affected directly by manurial treatments, of which a 0-10-20 or a 0-20-20 fertilizer gave the best results. Oil yield was found to increase as the plants approach full bloom. Cutting before the blossom stage (by 15 August in Indiana), however, is necessary to obtain planting stock, for which purpose a well-manured plot should be set apart. One acre so treated will plant 10 acres. Other points discussed are the composition of peppermint oil samples collected at intervals during the distillation, distillation of the weeds found in abundance in the district, distillation equipment, the storage of peppermint oil and its redistillation.

1722. MADUEÑO, M., AND PERELLÓ, J. M. 633.822
Contribución al estudio de la menta piperita.
(A contribution to the study of peppermint.)
Farmacognosia Anal. Madrid, 1944, **4**: 40-52.
The cultivation of peppermint, and the analysis of its essential oil, are described.

1723. BREMER, H. 633.842-2.4
On pod spot in peppers.
Phytopathology, 1945, **35**: 283-7.
It is tentatively concluded that in the pod-spotting of peppers both sunscald and blossom-end rot are identical troubles. The damage to peppers is believed to occur during strong solar radiation, but only in plants which are or have been influenced by wide fluctuations of water supply. A fungus, identified as *Alternaria longipes*, occurred on some of the spots; it proved to be a wound parasite, but cannot be the primary cause of the spots. Control measures recommended are to avoid fluctuations of the water supply and to provide moderate but frequent irrigations.

1724. GONZALEZ GOMEZ, C., AND MADUENO BOX, M. 633.844
Contribución al Estudio de la Mostaza Negra.
(A contribution to the study of black mustard.)
Farmacognosia Anal. Madrid, 1943, **2**: 45-63.
Indicates the possibility of introducing black mustard into Spain for cultivation on a large scale for its essential oil and for mustard powder.

1725. BUSTARRET, J., AND JONARD, P. 633.85(44)
Observations sur la culture et la sélection de quelques plantes oléagineuses. **(The cultivation and selection of oil plants. Part I. Choice, cultivation and selection in France.)**
Ann. agron. Paris, 1944, **14**: 77-97, bibl. 42.
The results of growing the following seed oil plants in different parts of France during the war are considered at some length:—autumn and spring grown rape, autumn and spring grown turnip, black mustard, white mustard, camelina, oil poppy, sunflower, safflower, soybean, linseed. The highest and most regular production was that from autumn grown rape and from turnip seed, the former being rather more exacting in the matter of soil. As regards spring crops the poppy, given good soil and careful attention, shows excellent returns in northern and central France. In the same districts white mustard in good non-acid soil and camelina under less favourable conditions are of interest for their quick growth and the fact that they can be sown on the stubble. Camelina appears to be better able to stand summer drought than white mustard. In the south sunflower does well as a catch crop on good soil, but on dry soils safflower is preferable. The other plants named deserve further trial under particular circumstances. The return in oil from a hectare of rape in northern France may well equal that from a hectare of groundnuts in Senegal, although normally the latter production will be more economic. The article contains a useful list of references.

1726. LAUMONT, P. 633.85(65)
Quelques oléagineux utiles. **(Some useful oil plants in Algeria.)**
Bull. Inspect. gén. Agric. algér. **51**, 1941, pp. 4.
The following oil crops, at present little grown in Algeria, are suggested for commercial cultivation to meet the emergency:—sunflower, peanut, rapeseed and oil poppy. Cultivation methods are briefly described.

1727. SCHMALFUSS, H. 633.85-1.56
Gewinnung und Erkennung der Senföle aus Raps. III. **(The detection of mustard oils in rape and their production. III.)**
Forschungsdienst, 1944, **12**: 481-3, bibl. 6.
The rape studied (*Brassica napus*) was found to contain only two volatile mustard oils: butenyl and a hitherto unknown pentenyl mustard oil.

1728. MOROZOV, V. K. 633.854.78: 575(47)
New varieties of sunflower. [Russian.]
Bull. Inst. Grain Husb. S.E. S.S.R., 1944, No. 2, pp. 6-10.
Five varieties are described, and the yields of seed and oil set forth. Each variety is recommended for cultivation in

those parts of the south-eastern U.S.S.R. for which it is considered to be especially suitable. One of the varieties matures in from 74 to 83 days, or 11 to 14 days sooner than the standard, Saratovskaja No. 169.

1729. Furr, J. R., and Reeve, J. O. 633.85: 631.67: 631.432
Range of soil-moisture percentages through which plants undergo permanent wilting in some soils from semiarid irrigated areas.
J. agric. Res., 1945, **71**: 149-70, bibl. 20.

Sunflowers were grown in samples of about 80 soils representing 50 soil types from southern California. The wilting range of these soils, i.e. the range of soil-moisture percentages between the first permanent wilting point, marked by permanent wilting of the basal leaves, and the ultimate wilting point, was determined according to a standardized procedure which is described. The moisture held within the wilting range of the soils investigated averaged about 20%, varying from about 11% to 30%. The effect of decreases in soil moisture on the osmotic pressure and turgor of sunflowers in humid and dry atmospheres is discussed in detail.

1730. Kucinski, K. J., and Eisenmenger, W. S. 633.854.78
Sunflowers as a crop.
Bull. Mass. agric. Exp. Stat. **415**, 1944, pp. 8.

For sunflowers growing in soils of average fertility a 5-10-5, 5-8-7 or 3-12-6 fertilizer is recommended, at the rate of 400-500 lb. per acre if applied in hills or double that amount if broadcast. Field trials have shown that the best spacing is one seed every 18 in. in 36-in. rows. Cultivation and harvesting methods, diseases and pests and uses of the sunflower stalk are also discussed.

1731. Morozov, V. K. 633.854.78: 575: 578.08(47)
Methods of breeding sunflowers. [Russian.]
Bull. Inst. Grain Husb. S.E. S.S.R., 1944, No. 2, pp. 11-8.

Though the oil-content of sunflower seeds has been gradually increased, their yield has been little affected. This failure is attributed to the methods of breeding sunflowers hitherto used and here criticized. Cross-pollination of individual plants is recommended here, similarity in the main characters being sought, but dissimilarity in genetical content and origin.

1732. Ananjeva, S. V. 633.854.78: 581.165.71: 575.125
The vegetative hybridization of sunflowers. [Russian.]
Bull. Inst. Grain Husb. S.E. S.S.R., 1944, No. 2, pp. 19-25.

In an attempt to increase the oil-content and yield of No. 169 and Saratov Early, and shorten the vegetative period of No. 3519, these three varieties were grafted on different stocks. Each variety was fertilized with mixed pollen from the ungrafted plants of the same variety. It was found that vigorous stocks increased the vigour of the scions. Repeated grafting of annual sunflowers on Jerusalem artichokes modified the colour and shape of the tubers. The most pronounced influences were exercised by those stocks which were the sexual products, in the first generation, of parent plants exhibiting heterosis. It is concluded that vegetative hybridization enables the vigour and productiveness of sunflowers to be increased and, by means of selection and free pollination confined within any particular vegetative hybrid, maintained thus for successive generations.

1733. Poggendorff, W. H. 633.854.54
The production of linseed in New South Wales.
Agric. Gaz. N.S.W., 1945, **56**: 191-4.

The introduction of the linseed variety Walsh promises to make successful production of the crop in New South Wales possible. Districts believed to be most suitable for linseed growing under the Department of Agriculture Scheme are named, and instructions on cultivation and harvesting methods are given.

1734. Zogg, H. 633.85-2.19: 546.27
Die Herzfäule des Oelmohns und ihre Bekämpfung. **(Heart rot in the oil poppy and its control.)**
Flugbl. eidg. landw. Versuchsanst. Zürich-Oerlikon **14**, 1944, pp. 4.

The symptoms of heart rot at different developmental stages of the oil poppy are described and pictured. It was not possible to cure affected plants by boron treatment, but the disorder was prevented by applications of 20 kg. borax per hectare, previous to planting. The application of borax in liquid form (0·5-1% solution) was found to achieve a better distribution of the chemical in the soil.

1735. Fourment, —., and Roques, —. 633.88(65)+633.81(65)
Répertoire des plantes médicinales et aromatiques d'Algérie. **(Medicinal and aromatic plants of Algeria.)**
Bull. Inspect. gén. Agric. algér. **61**, 1942, pp. 159, fr. 25.

An illustrated description of the plants, arranged according to families, with information on time of harvest and use.

1736. Madueño Box, M., and Serranillos, M. G. 633.859
Contribución al estudio del opio en España. **(A contribution to the study of opium in Spain.)**
Farmacognosia Anal. Madrid, 1942, **1**: 149-59.

A study of the possibilities of cultivating the opium poppy in Spain showed that calcium superphosphate and potassium sulphate have no effect on the opium yield or on its morphine percentage.

1737. Bellot Rodriguez, F. 633.863.9
Acerca de la distribución e importancia de la Gamarza (*Peganum Harmala* L.). **(On the distribution and importance of Syrian rue.)**
Farmacognosia Anal. Madrid, 1944, **4**: 127-42.

The paper deals chiefly with the distribution of Syrian rue (the source of turkey-red), and discusses the chemical constitution of the product obtained from it.

1738. Homedes Ranquini, J. 633.88.1.535
Ensayo de multiplicacion asexual del híbrido *Atropa Baetica*×*Atropa Belladona*, cultivado en el Jardin Botánico de Barcelona. **(An experiment on the vegetative propagation of the hybrid *Atropa baetica*×*Atropa belladonna*, cultivated in the Botanic Garden of Barcelona.)**
Farmacognosia Anal. Madrid, 1943, **2**: 301-4.

The authors obtained promising results from treating cuttings, taken from the secondary branches, with phenylacetic acid.

1739. San Martin Casamada, R. 633.88
Contribución al estudio farmacognóstico de algunas especies de *Atropa* y particularmente de un híbrido interespecífico. **(A contribution to the pharmacological study of certain species of *Atropa*, particularly of an interspecific hybrid.)**
Farmacognosia Anal. Madrid, 1943, **3**: 39-48.

The author describes the foliage of a variety obtained from the cross *Atropa belladonna* ♀ × *Atropa baetica* ♂. The hybrid yielded about twice as much alkaloid as either of the parent species.

1740. Perello Barcelo, J. M. 633.88
Estudios farmacognósticos sobre las hojas de *Arctostaphylos uva-ursi* Sprengel. **(Pharmacological studies of the leaves of *Arctostaphylos uva-ursi* Sprengel.)**
Farmacognosia Anal. Madrid, 1943, **3**: 49-136.

The author points out the pharmacological importance of

the red bearberry in Spain. The distribution of the species is discussed. The leaves of the Spanish bearberry are found to be morphologically different from those of the Tyrolean form. The biochemistry of the leaves is treated at some length.

1741. MADUEÑO BOX, M. 633.88
Contribuciones al estudio de plantas medicinales productoras de alcaloides. **(Contributions to the study of medicinal plants producing alkaloids.)**
Bol. Inst. nac. Invest. agron. Madrid, 1944, No. 10, pp. 137-76, bibl. 62.
The author shows that *Atropa baetica* gives a lower yield than *Atropa belladonna* but is harder to transplant and has a lower percentage of germination. *A. baetica* is slightly richer in alkaloid, but the alkaloid of *A. belladonna* is stronger. He also shows that the quantity and quality of the leaves of *Datura stramonium* are increased by irrigation, by eliminating the flowers and by adding ammonium sulphate to the soil.

1742. MENDEZ CAMACHO, A., AND SANCHEZ JURADO, A. 633.88
Contribucion al estudio de la escila. **(A contribution to the study of the squill.)**
Farmacognosia Anal. Madrid, 1944, **4**: 165-69.
Describes the plant association in which the squill (*Scilla maritima* L.) is found, and gives the methods of testing the product from the bulbs.

1743. ARRUDA, S. C. 633.88.11.871
Observacões sobre algunas doenças de eucalipto no Estado de S. Paulo. **(Observations on some diseases of eucalyptus in the Province of San Paulo.)**
O Biológico, 1943, **9**: 140-9.
Three diseases of eucalyptus in the province of San Paulo, Brazil, are described. A wilting of seedlings in the seed-bed and after transplanting is attributed to *Cylindrocladium scoparium*, the cause of crown canker of roses in the United States; lesions appear at ground level and the plants collapse and wither; control measures recommended are: sterilization of the soil by hot water or formalin and the disinfection of the seed-boxes with creosol or a 5% solution of copper sulphate. Diseases of the mature trees are crown rot with gummosis, and intumescences at the collar. Crown rot is caused by *Phytophthora parasitica*; the treatment recommended is to cut out all the discoloured tissues down to the healthy wood. The intumescences resemble those of crown gall caused by *Phytomonas tumefaciens*, but the presence of this organism in the eucalyptus galls could not be verified and in two cases *Cylindrocladium* was found associated with the lesions; the only recommendation that can be offered at present is the elimination of all seedlings bearing these collar lesions.

1744. FEDERER, W. T. 633.913
Studies on sample size and number of replicates for guayule investigations.
J. Amer. Soc. Agron., 1945, **37**: 469-78, bibl. 10.
The plant characters studied were percentage of rubber, dry weight of shrub and weight of rubber.—Guayule Research Project, Salinas, Calif.

1745. ROMNEY, V. E., YORK, G. T., AND CASSIDY, T. P. 633.913-2.754
Effect of *Lygus* spp. on seed production and growth of guayule in California.
J. econ. Ent., 1945, **38**: 45-50, bibl. 6.
Lygus hesperus and other closely related species are present in abundance on Californian guayule. Trials under cage conditions showed (1) that bug infestation reduced the weight and viability of guayule seed and (2) that when no seeds of pre-dough stage are available the insect feeds on the current season's shoots, inhibiting growth and flowering.

1746. CASSIDY, T. P., ROMNEY, V. E., AND YORK, G. T. 633.913-2.754
The role of arsenicals in reducing *Lygus* injury to guayule seed.
J. econ. Ent., 1945, **38**: 50-1, bibl. 4.
Six applications of arsenicals or of a sulphur-arsenical mixture were found to reduce significantly the injury to guayule seed caused by *Lygus hesperus* infestation, although the number of bugs decreased only slightly as a result of the treatment. The experiments were carried out near Salinas, Calif.

1747. ADDICOTT, F. T. 633.913: 581.144.4
The anatomy of leaf abscission and experimental defoliation in guayule.
Amer. J. Bot., 1945, **32**: 250-6, bibl. 12.
Leaf fall from guayule under field conditions is considered to be a modified type of abscission. The abscission layer is not directly involved in the separation of the leaf from the stem. Separation is mechanical and occurs after the leaf dies by a break which passes through the weak abscission zone at the base of the leaf. Defoliation in the flash-drying process is accomplished by a break passing across the cells of the abscission zone after the tissues have been made brittle by dehydration. Defoliation by the flash-boil method apparently results from the softening of the middle lamellae. When leaves are removed after this treatment the break passes between cells. [From authors' summary.] —University of California, Santa Barbara.

1748. SMITH, P. F. 633.913: 577.15.04
Auxin in leaves and its inhibitory effect on bud growth in guayule.
Amer. J. Bot., 1945, **32**: 270-6, bibl. 23.
The experimental results indicate that the auxin produced by guayule leaves, which was shown to be 3-indoleacetic acid, is important in the retardation of new bud growth after transplanting and also plays a role in the branching of normal plants. An inverse relationship was found to exist between the transplantability of guayule plants and their auxin content at the time of transplanting. The amount of auxin (on a dry weight basis) present in succulent nursery plants, which had received water during the whole growing period, proved to be twice as high as in drought-hardened plants of the same age. The yield of auxin from guayule tissues is of the usual order of magnitude, viz. 44 micrograms per kg. in mature leaves, but auxin distribution in guayule differs from that reported for certain other plant materials in that fully matured leaves yield more auxin on a unit of weight basis than young leaves and that the apical buds are scarcely any richer in auxin than the young stems.

1749. NICHIPOROVICH, A. A., AND IVANITZKAYA, E. F. 633.913: 581.14
On the working conditions of the foliage as a factor of differentiation of laticiferous vessels in kok-saghyz roots.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 36-9, bibl. 5.
By subjecting kok-saghyz plants to a variety of experimental treatments it was shown that the intensity of differentiation of the latex vessels in the root within individual rings and the increase in the diameter of the vessels are variable characters and very susceptible to growing conditions. This affords opportunities for breeding varieties of higher rubber content and for devising improved methods of cultivation. The removal of leaves was found to stimulate the development of latex vessels, though an increase in the number of vessels per ring as a result of leaving predominantly young leaves on the plant was associated with a decrease in rubber content in the vessels. A formula is suggested by which the relative rubber content of a vessel may be expressed.—K. A. Timiriazev Institute of Plant Physiology.

1750. MASHTAKOV, S. M. 633.913: 581.192
Chemical changes occurring in roots of kok-saghyz during summer pause.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 296-8, bibl. 15.
The period of summer rest leads to a reduction of the total organic mass of the roots of kok-saghyz, mainly at the expense of carbohydrates; during the period of rest an intense hydrolysis of inulin and proteinic substances is observed; the amount of rubber remains constant. Synthesis and accumulation of rubber in the roots of kok-saghyz are resumed only during the secondary growth processes, when the pause is over. [Author's conclusions.]—Agricultural Institute, Sverdlovsk.

1751. MANSKAJA, S. M., AND POPOV, G. I. 633.913: 581.6: 575
Increasing the rubber content of kok saghyz. [Russian.]
Izvestia Akad. Nauk S.S.S.R. (Biol. Ser.), 1944, No. 4, pp. 187-92.
When the roots of ordinary kok saghyz plants increase in size, the content of rubber does not increase proportionately but lags behind; consequently, the plant breeder cannot place unreserved trust in the size of roots as a guide in his choice. A new type of plant has been discovered, however, in the root of which additional vascular bundles occur, each surrounded with latex vessels. The roots are not only larger than normal, but contain more latex. The origin of the additional vessels is discussed. They are especially numerous near the crown of the root, and seem to be connected, therefore, with the leaf and stem system of the plant. The character described was found to be transmissible through successive generations, both vegetatively and by seed.

1752. BLOHINCEVA (BLOKHINTZEVA), I. I. 633.913: 581.192
Changes in the rubber particles in the latex of krym-saghyz and kok-saghyz during growth. [Russian.]
Izvestia Akad. Nauk S.S.S.R. (Biol. Ser.), 1944, No. 4, pp. 193-204.
The rubber particles in krym saghyz are, at first, spherical and small, but become rod-shaped and larger as the plant grows older, those of kok saghyz remain spherical, but grow somewhat bigger as the plant matures. The quality of the rubber is believed to be connected with these changes; rod-shaped particles, such as those in krym saghyz and tau saghyz, do indeed correspond to a better rubber than do spherical particles. The presence of small spherical particles in large numbers indicates the active formation of such particles and of new latex vessels. Towards the end of the season, new particles cease to be formed, and the latex begins to coagulate in the latex vessels, which gradually die, the latex in them forming into strands of rubber.

1753. GREÉN, S. 635.11: 631.531
Tidig och sen sådd av rödbetor. **(Early and late beetroot sowings.)**
Fruktodlaren, 1945, No. 3, pp. 102-3.
At Weibullsholm, Sweden, date of sowing trials with beetroot varieties were carried out for a period of years. While the percentage of plants running up to seed varied with seasonal conditions, the rate of bolting following sowings in March and April was consistently and markedly lower in the old Swedish variety Egyptisk Plattrund than in recently introduced foreign varieties, such as Detroit or Good for All. Apparently, the setting in of low soil and air temperatures after sowing is conducive to bolting. Although the foreign varieties are superior in quality, they should not be used for early sowings until better adapted to Swedish conditions.

1754. WHITE, N. H. 635.13: 632.411
Fungal soft rot of carrots.
Tasm. J. Agric., 1945, **16**: 59-60, bibl. 1.
Towards the end of May 1944 many carrots grown in the Smithton swamps, Tasmania, were affected with a soft rot, which occurred at the tips and lowermost parts of the root and was caused by *Phytophthora megasperma*. Inoculation experiments showed that only roots predisposed by "drowning" are susceptible to infection. Waterlogging of the soil in combination with exceptionally heavy rainfalls in May 1944 is therefore regarded as the cause of the outbreak, the last outbreak in 1931 having been associated with similar conditions. Since growing carrots are more resistant to an attack of the fungus than mature roots, lifting in April is recommended for carrots grown in Smithton swamp soil; good drainage should be provided.

1755. WILSON, G. F. 635.13: 632.77
Small-scale carrot fly control.
Agriculture, 1945, **52**: 219-23, bibl. 4.
This paper concerns the results obtained at Wisley in 3 years' investigations on small-scale measures against the carrot fly in relation to garden and allotment crops, which were the subject of a paper appearing in *J. roy. hort. Soc.*, 1945, 70: 84-9, see *H.A.*, 15: 683.

1756. MORRISON, H. E., MOTE, D. C., AND RASMUSSEN, W. B. 635.13: 632.77
DDT to control the carrot rust fly [*Psila rosae*].
J. econ. Ent., 1945, **38**: 283.
Results were very promising.

1757. KREMER, J. C. 635.15: 581.162.3
Influence of honey bee habits on radish seed yield.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **27**: 413-20.
The following methods of promoting the pollination of a radish crop by honey bees are recommended: (1) Avoid competition of "major" honey plants, (2) locate radish fields within a 2-mile radius of permanent beehives and (3) maintain colonies of bees on the premises during the blooming season.

1758. BARRONS, K. C., AND MCLEAN, D. M. 635.15: 631.531
A study of the causes of low germination of radish seed crops.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **27**: 398-408, bibl. 3.
The unavailability of European radish seed has greatly increased the acreage devoted to this crop in Michigan since 1940. Not infrequently, however, the seed produced by the contracting grower has failed to reach the germination standard demanded by the seedsman, usually 85%. An investigation into the causes of this failure has ruled out pathogens and adverse weather conditions during curing as probable immediate sources of the trouble. The experimental results show that the high moisture content of the seed in the sack is responsible for lowering the germination capacity, even in the absence of heating and mould development. Immediate drying of the seed after threshing is the obvious remedy recommended.

1759. WALLACE, J. C. 635.25
Onion trials.
Kirton agric. J., 1943, No. 9, pp. 25-7.
MCKENZIE, W. F., AND MORRIS, J. W.
Kirton agric. J., 1943, No. 10, pp. 40-1.
The results of three years' trials of onion varieties are very briefly recorded. Crop weights given for each year show that no one variety is pre-eminent.

1760. HARGRAVE, J., AND THOMPSON, F. C. 635.25-1.8
The use of salt in the manuring of onions.
Kirton agric. J., 1943, No. 9, pp. 19-23.
Trials on light silt loam soil in Holland (Lincs.) showed reduced yields in all cases following the application of salt given either some time before transplanting with and without compound fertilizer or as a top dressing.

1761. IVANOFF, S. S. 635.25: 631.523
Expression of certain hereditary factors in Yellow Bermuda onions induced by unseasonable planting in the greenhouse.
Bot. Gaz., 1945, **106**: 411-20, bibl. 10.

The exposure of Yellow Bermuda onion plants, sown in a greenhouse in June, to very high temperatures and light intensities caused certain remarkable variations which are described and the significance of which in relation to onion breeding is discussed. The finding that 10-40% of all unseasonably grown plants completed their life cycle in less than a year, forming multiple bulbs and stems with viable seed, may find commercial application. It is suggested that seed may be produced in one growing season in certain areas by planting early and directly in the field.—Texas Agricultural Experiment Station, Substation 19, Winterhaven.

1762. SMITH, F. F., AND GOODHUE, L. D. 632.951: 631.544
DDT aerosols to control onion thrips and other pests in greenhouses.
J. econ. Ent., 1945, **38**: 173-9, bibl. 4.

In the greenhouse an aerosol containing 5% each of DDT, cyclohexanone, lubricating oil and acetone dispersed in dichlorodifluoromethane proved highly successful under many conditions to greenhouse pests with extremely little injury to plants.

1763. GOODEY, T. 635.25: 632.651.3
Calomel and onion eelworm.
Nature, 1945, **156**: 393-4, bibl. 3.

On the strength of experiments the author disputes F. O. Mosley's claim that the onion eelworm, *Anguillulina dipsaci*, may be controlled by calomel (*ibid.*, 1945, 155: 544-5; *H.A.*, 15: 1149). Fumigation of onion seed with methyl bromide, on the other hand, will destroy the parasite without injuring the seed, only slightly retarding its germination. The detailed results of this study will be published in the Journal of Helminthology.

1764. THOMPSON, B. G. 635.25: 632.754
DDT to control *Psallus ancorifer* [plant bug] in onions.
J. econ. Ent., 1945, **38**: 277.

Full control was achieved.

1765. WAIN, R. L. 635.25: 632.954
Experiments on the control of weeds in onions.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 115-20, bibl. 7.

Trials with dinitro-ortho-cresol (D.N.C.) and sulphuric acid shows the danger to the onions of using pre-emergence sprays containing D.N.C. Pre- and post-emergence spraying with sulphuric acid (pre-, 13½% B.O.V.; post-, 10%) resulted in an excellent yield of onions as good as those from the hand-weeded plots, and the cost of the operation was, moreover, decidedly lower than that of hand-weeding. Post-emergence (only) spraying with sulphuric acid (10% B.O.V.) or with D.N.C. (0·51%) resulted in fairly satisfactory results in both cases, but not so good as pre- and post-emergence sulphuric acid spraying.

1766. SMITH, H. P., ALTSTATT, G. E., AND BYROM, M. H. 635.262
Harvesting and curing of garlic to prevent decay.
Bull. Tex. agric. Exp. Stat. **651**, 1944, pp. 28.

Garlic production on a commercial scale was taken up in Lavaca and Fayette counties, Texas, in 1929. Initial disappointments led to an experimental investigation into the causes of poor stands and the early decay of garlic bulbs. Presenting the data collected in 9 years' fertilizer, curing, fungicide, variety and cultivation trials, the authors come to the following conclusion:—To obtain best yields and a good quality of garlic, sound, disease-free seed pieces should be planted on low ridges in October and early November, harvested when most of the tops have turned brown, and then cured under shelter on open racks for 10 to 14 days.

1767. MILES, H. W. 632.76: 635.3
Experiments on the control of flea beetles on *Brassicae* in the Western Province.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 145-9, bibl. 2.

Applications of D.D.T., P.P. 666 and basic slag all checked the loss of seedling brassicas from flea beetles, but 9 to 16 days after treatment more plants were established on the plots treated with D.D.T. and P.P. 666 than on the untreated and slag-treated plots. Whereas one application with D.D.T. or P.P. 666 was apparently sufficient, several applications of basic slag may be necessary according to season and locality.

1768. DEPARDON, L., AND BURON, P. 635.31(44)
Conditions agrologigues de la culture de l'asperge. **(Conditions favourable to asparagus growing.)**
Ann. agron. Paris, 1943, **13**: 415-20, bibl. 2.

Trials in the Loire valley show that asparagus, while indifferent as to the geological nature of the soil, is very sensitive to its physical nature. In this respect the conditions most favourable to growers are a sandy layer at least 50 cm. in depth overlying a thin horizon of argillaceous accumulation or fresh sands, where its roots can seek out the small amount of water necessary. Asparagus does well in very poor soils owing to its strong root system, but it needs heavy organic manuring and considerable quantities of fertilizer, especially nitrogenous and potassic, as well.

1769. SUKORCEVA, K. D. 635.31(47)
Asparagus. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 4, pp. 31-4.

This is a plea for the extended cultivation of asparagus in the U.S.S.R. because of its high qualities as a vegetable—its attractive taste, and its richness in proteins and vitamins A and C. The plant is only briefly described, but the field technique of raising and cultivation is set out in detail with illustrations.

1770. LAMM, R. 635.34/36(485): 631.521
Lokala sort- och stamförsök med kålväxter under åren 1939-1941. **(Variety trials with cole crops at different localities in Sweden during 1939-41).** [English summary, pp. 2.]
Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri och Trädgårdsinst.*, 1943, pp. 40, bibl. 18, being *Meddel. Statens Trädgårdsförsök* **19**.

The requirements and performance of cabbage, savoy, red cabbage, cauliflower and brussels sprouts varieties under different conditions are discussed. The numerous tables present data, among others, on time of planting, yield per 100 square metres and earliness at different localities.

1771. RAPHAEL, T. D. 635.34
Cabbage trials. With notes on seed production.
Tasm. J. Agric., 1945, **16**: 46-52.

Recent cabbage trials are reviewed. The most successful varieties were Copenhagen Market, Succession, Marion Market and Fottlers Brunswick. In the varieties tested, total weight yields varied from 25 to 35 tons per acre, and the harvesting period extended from the middle of January to the end of March. Notes are given on marketing qualities, with special reference to Copenhagen Market. Successful methods used for the production of cabbage seed are briefly discussed. [From author's summary.]

1772. DEMUSENKO, P. M. 631.67: 635.34+635.63
Irrigation of cabbages and cucumbers in the Moscow province: when to apply and how much water to use. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 4, pp. 20-4.

Experiments are described and the results, particularly with regard to increased yields from irrigation, are presented in tabular form.

1773. McCool, M. M. 631.841.5: 635.34 + 635.656
Effect of sodium cyanide on number of fungi, bacteria, and *Actinomyces* in soil and its value in the control of damping off of seedlings, nematodes and cabbage root worm.
Contr. Boyce Thompson Inst., 1945, **13**: 463-72, bibl. 10.

The damping off of cabbage and pea seedlings was partially controlled by the addition of 200 and 300 parts per million of sodium cyanide to the soil where the containers remained sealed 48 hours after the salt was mixed with the soil. The placement below the seed of 0·06, 0·09, 0·12 and 0·15 gram of sodium cyanide per linear foot in the order given, partially controlled the damping off of cabbage and 0·075, 0·10 and 0·125 gram that of tobacco seedlings. Sodium cyanide proved to be effective in the control of nematodes which attacked the roots of tomato plants, where it was applied seven inches below the surface of the soil and where the receptacles remained sealed 72 hours before the soil was removed and the plants set in it. [From author's summary.]

1774. Walker, J. C., and Hooker, W. J. 635.34: 632.48
Plant nutrition in relation to disease development. I. Cabbage yellows.
Amer. J. Bot., 1945, **32**: 314-20, bibl. 14.

The influence of host nutrition on the development of the yellows disease (*Fusarium oxysporum* f. *conglutinans*) was studied in young cabbage plants growing in varying concentrations (0·05H-3H) of the Hoagland solution in quartz sand. Three strains of the host representing extreme susceptibility, intermediate and high resistance and two sand temperatures, viz. 19° and 25° C., were used, the latter temperature favouring the disease. The authors conclude from their results, which are presented in detail, that under the conditions of these experiments "nutrition did have an effect upon disease development in that increase in salt concentration, except at the low levels, progressively retarded disease development while low nitrogen and low phosphorus tended to retard, and low potassium tended to enhance, disease development. The extent of nutritional effect, however, was conditioned by the interaction of temperature and the degree of inherent host resistance. It appears, therefore, that cabbage yellows has the same type of response to nutrition as has been recorded for other vascular *Fusarium* diseases."—The investigation is a joint contribution from the University of Wisconsin and the Bureau of Plant Industry, Soils and Agricultural Engineering, Madison, Wisconsin.

1775. Greaves, T. 635.34: 632.6/7
Experiments on the control of cabbage pests in North Queensland.
J. Coun. sci. industr. Res. Aust., 1945, **18**: 110-20, bibl. 6.

The results of two trials in the Burdekin area are reported. In the first dusts containing D.D.T. (1% and 5%), lead arsenate (10% and 20%), calcium arsenate (10% and 20%) and cryolite (40%) given in 4 applications at 10-day intervals gave very satisfactory control of the larvae of *Hellula undalis*, *Heliothis armigera*, *Prodenia litura* and *Crocidolomia binotalis*. In the second trial D.D.T. (1% and 5%) dusts were significantly better than all other treatments against cabbage moth (*Plutella maculipennis*) and green peach aphid (*Myzus persicae*). Details are given of the control given by the different substances.

1776. Pickford, P. T. H. 635.35: 631.8
Manurial experiments on vegetable crops. VIII. Effects of farmyard manure and other manurial treatments on cauliflower.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 73-5, bibl. 3.

In these cauliflower manurial trials a complete fertilizer, using hoof as the basal nitrogen, gave a significantly higher yield than a complete fertilizer with sulphate of potash. The vegetable compost treatment resulted in a significantly lower yield than the complete fertilizer with hoof and the complete fertilizer with potash salts. [From author's summary.]

1777. Gonzalez Gomez, C., and Madueño Box, M. 635.48
El cultivo del ruibarbo en España. (**The cultivation of rhubarb in Spain.**)
Farmacognosia Anal. Madrid, 1944, **4**: 11-39.

This paper describes the cultivation, propagation and manuring of rhubarb in Spain, and the preparation of the medicinal powder.

1778. Anon. 635.52: 632.3/4 + 632.8
Diseases of lettuce.
Agric. Gaz. N.S.W., 1945, **56**: 251-4, 272.

The most serious disease of lettuce in New South Wales is spotted wilt. It is particularly damaging in the Sydney Metropolitan Area owing to the vicinity of crops which serve the thrips as alternate hosts. Twelve other diseases and troubles of varying significance are also described. The usual control measures, such as crop rotation, the planting of disease-resistant varieties, seed treatment, soil sterilization, spraying and field sanitation are briefly discussed.

1779. Doolittle, S. P., and Ross, C. T. 635.52: 632.8
Artificial transmission of the virus of big vein of lettuce.
Abstract in *Phytopathology*, 1945, **35**: 484.

Recent experiments have shown that infection of lettuce is readily secured when freshly extracted juices of roots of big-vein plants are rubbed on the leaves or pricked into the leaves or stem. Drying the roots for 7 days seemed to inactivate the virus.

1780. Brunk, M. E. 635.53
Celery harvesting methods in Florida.
Bull. Fla agric. Exp. Stat. **404**, 1944, pp. 32.

This well-illustrated study of handling celery, from the time of the first harvesting operation until it is placed in the shipping crate in the washhouse, is presented under the following headings: Description of methods commonly used (in 3 areas), variations in total labour requirements, studies of operation in the process of harvesting celery (cutting and stripping, field packing, top cutting, etc.), crew organization and management, mechanical harvesting.

1781. Cheal, W. F. 635.53: 632.4
Celery blight in Isle of Ely.
Fruitgrower, 1945, **100**: 258.

Following the tremendous damage caused by celery blight (*Septoria apii*) in the Isle of Ely area during the 1944 growing season, trials were carried out at Whittlesea, where the plants are raised, in the spring of 1945 to ascertain whether colloidal copper sprays applied on seedling celery not pricked out and still under glass would have any harmful scorching effect. The tests gave satisfactory results and the use of colloidal copper sprays or of a good home-made bordeaux mixture, in addition to seed treatment is recommended, applications to be made at the pre-pricking-out stage under glass. Early preventive spraying in the field should be carried out with the same chemicals. The addition of a harmless colouring matter to the colloidal copper sprays by the manufacturer is suggested.

1782. Nelson, R., and Anderson, A. 635.53: 632.4
Experiments with copper-sulfur dusts for the control of celery leaf blights.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 253-64, bibl. 2.

The monohydrated copper sulphate-lime mixtures, used as standard dust fungicides for the control of celery leaf blight diseases, have certain undesirable physical properties affecting their efficacy and, because of their high lime

content, tend to shift the soil reaction to the neutral or alkaline range. As the result of experiments undertaken to find new materials which would avoid these drawbacks, a mixture is recommended consisting of red cuprous oxide sufficient to furnish approximately 6% metallic copper, 20-30% superfine dusting sulphur and a highly alkaline talc diluent. Owing to the superiority of its physical properties the new copper-sulphur-talc dust achieves better coverage of the leaves with less material than the old copper sulphate-lime mixture and has a higher residual effect following prolonged weathering. Further, no alkalizing action is associated with the use of the new fungicide, which has proved its worth already in commercial trials carried out by growers.

1783. VAN DER BRUEL, W. E. 635.54: 632.77
A propos de la lutte contre les mouches de la chicorée de Bruxelles (*Napomyza lateralis* Fall. *Ophiomyia pinguis* Fall.). **(Control of chicory flies.)**
Bull. Inst. agron. Gembloux, 1941, **10**: 26-52.

The author describes photographically and diagrammatically an apparatus successfully used for applying hot water treatment to chicory roots on a large scale. Numerous trials with roots, some of which were later forced and others raised without forcing, showed that soaking for 90 minutes in water at 40° C. is an effective and practical control for chicory flies. The treatment does not affect the quality of the blanched heads, in fact it quickens their growth, thus shortening the time necessary for forcing. Much larval damage occurs during forcing and here experience shows that blanched heads infested with larvae should be kept at a low temperature which checks the activity of the pests. The boring of galleries diminishes greatly at a temperature of from 0° to 2° C. But even one of 0° to —2° does not entirely annihilate the larvae.

1784. BOUCKAERT, G., AND DRICOT, C. 635.54: 631.544: 631.588.1
Essais sur le chauffage électrique des couches de Witloof. **(The use of electricity for heating Witloof chicory forcing beds.)**
Bull. Inst. agron. Gembloux, 1940, **9**: 100-22, bibl. 7.

This paper, which contains explanatory diagrams and numerous figures and graphical presentation of results, is summarized by the authors as follows:—The results obtained by us show that electric heating of forcing-beds offers considerable advantages and can be profitable. Three types of bed were tried: (1) bed of 6·30×1·00 m. with the heating cables placed below the roots; (2) bed of 6·30×2·08 m. with the heating cables placed below the roots; (3) bed of 6·30×1·00 m. with the heating cables placed above the roots. The following results were obtained:

kWh/kg. of heads	Bed No. 1:	0·59
	Bed No. 2:	0·42
	Bed No. 3:	—
kWh/m² of bed	Bed No. 1:	1·09
	Bed No. 2:	0·75
	Bed No. 3:	1·11

1785. CULPEPPER, C. W., AND MOON, H. H. 635.6: 581.192
Differences in the composition of the fruits of *Cucurbita* varieties at different ages in relation to culinary use.
J. agric. Res., 1945, **71**: 111-36, bibl. 16.

Thirty-six varieties of pumpkins and winter squashes, grown for 1 to 4 years, were analysed at different stages of development and after different periods of storage. Statistical analyses of the data indicated rather large differences in the extent to which many of the constituents varied, the sources of greatest variation being differences in age of the material and differences among varieties. When calculated as percentage of the fresh weight the mean total-solids content decreased during the first 10 days of growth and then increased to the 40-day stage, after which there was a slow decline. The sugars increased during the developmental period and the first 60 days of storage. The acid-hydrolysable polysaccharides increased rapidly to the 30- or 40-day stage and then almost as quickly decreased to the 90-day stage, after which the decline was slow. When the results for each constituent for all stages of maturity in all years were averaged it was found that in general the varieties markedly high in sugar were also markedly high in acid-hydrolysable polysaccharides; that those high in total solids were high in soluble solids and only moderately high in total nitrogen. The varieties that were high in acid-hydrolysable polysaccharides at the time of maturity generally became high in sugar during storage as a result of the conversion of starch into sugar. Differences in the flavour, consistency, and appearance of *Cucurbita* varieties were often very great and were directly related to differences in composition. Because of these differences some varieties that are excellent for one purpose may be only mediocre for another. [From authors' summary.]

1786. VELIKANOV, V. A. 635.61
Acclimatizing water-melons and melons in the Gorkov province. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 4, pp. 27-30.

The Gorkov region of the U.S.S.R. has a very short growing season with a late spring and early autumn; late frost may occur in early June and early frosts have been known at the end of August. Melons and water-melons, however, may be grown successfully. Certain varieties are recommended as proving suitable for the region. The seed may be sown in the open, on manure sunk in holes in the ground, the young plants being protected by glass.

1787. RUDENKO, A. G. 635.61
Pinching back water-melons. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 7, pp. 20-1.

Pinching-back (removing the growing point of the shoot) is practised in many crops but, according to the author, has not been sufficiently applied in the cultivation of cucurbits, particularly water-melons. In an experiment with water-melons two methods were compared: (1) removing the tip of the main shoot when 3-5 leaves had developed, and (2) as in (1) but in addition also tipping the laterals when they had produced three leaves. The resulting crops were in the proportion: control 100; method (1) 185; method (2) 196.

1788. HARTMAN, J. D., AND GAYLORD, F. C. 635.611
The Purdue 44 Muskmelon.
Circ. Purdue agric. Exp. Stat. **295**, 1944, pp. 8, bibl. 5.

Purdue 44 originated from an open pollination of a New Seed Breeders flower, a muskmelon variety of the Hale's Best type. On the sandy soils of southwestern Indiana the productivity of the new strain is greatly superior to that of other varieties. Purdue 44, which is resistant to *Alternaria* leaf spot though not to bacterial wilt, is of the Hale's Best type, and its season of maturity ranks with the earlier varieties of the same type.

1789. WALKER, M. N. 635.615: 632.8
Galls on the roots of citron-watermelon hybrids.
Phytopathology, 1945, **35**: 480-2.

When the hybrid plants were pulled up peculiar galls were noticed on the roots of many of them. The growths appeared to be appended to the roots by definite stalks; this character of the galls is a point of difference from the galls induced either by *Bacterium tumefaciens* or the root-knot nematode *Heterodera marioni*. Another characteristic

of some of the growths was the proliferation of roots round the galls.

1790. WALKER, M. N. 635.615: 632.48
The Blacklee watermelon. A new *Fusarium* wilt-resistant variety for Florida.
Pr. Bull. Fla agric. Exp. Stat. **605**, 1944, pp. 4.
The Blacklee watermelon which arose from a cross of the Hawkesbury (male) and Leesburg varieties, was shown to be very resistant to *Fusarium* wilt and to be equal to popular commercial varieties in respect of size, vigour and productiveness.

1791. PONTIS, R. E. 635.62: 632.411
Phytophthora capsici en frutos de "Zapallito de tronco". (***Phytophthora capsici* attacking the fruit of squash.)**
Rev. argent. Agron., 1945, **12**: 17: 21, bibl. 12.
The occurrence in Brazil of *Phytophthora capsici* Leon. as a parasite on the squash (*Cucurbita maxima* Duch. var. C.) is reported for the first time. The fungus attacks the fruit, causing a rapid internal rot, and the stems near ground level; when the lesions girdle the stems the plants wilt.

1792. EICHMANN, R. D. 635.621: 632.754
Squash bug depredations in Washington.
J. econ. Ent., 1945, **38**: 110-2, bibl. 8, being *Sci. Pap. St. Coll. Wash. agric. Exp. Stat.* **597**.
Anasa tristis attack of squash, also termed *Anasa* wilt of cucurbits, has assumed outbreak proportions in the Yakima Valley, Washington, where the leading variety, Marblehead, is very susceptible to squash bug injury. Certain climatic factors, however, seem to have reduced the danger at present. The protection of seedlings from overwintered bugs is described as the central control problem, while the destruction of summer broods with pyrethrum or activated nicotine dusts is easily achieved, though not profitable in bad pest years in view of the frequent applications required. The value of the recently introduced squash bug parasite *Trichopoda pennipes* remains to be determined.

1793. TYNER, L. E. 635.623: 632.48
***Fusarium sambucinum* FKL. F.6 WR. as a pathogen of some species of the *Cucurbitaceae*.**
Sci. Agric., 1945, **25**: 537-41, bibl. 3, being *Contr. Div. Bot. Sci. Serv. Canada Dep. Agric.* **811**.
The pathogen isolated from severely wilted vegetable marrows at Brooks, Alberta, was identified as *Fusarium sambucinum* f.6, the plants being affected with an extensive buff-coloured dry rot in the crown region. Inoculation experiments showed the susceptibility of squash, pumpkin, muskmelon and cucumber to the fungus, while isolates from potato tubers and alfalfa roots did not cause infections in cucurbits.

1794. MARAIS, J. G. 635.624
Boer pumpkins.
Fmg S. Afr., 1945, **20**: 415-8, 448.
Marketing, planting and cultural treatment, harvesting and storing of Boer pumpkins in South Africa are discussed and the characters that go to make a desirable type are described. The article concludes with the recommendation that the crop should be cultivated on a small scale on a large number of farms.

1795. WIANT, J. S. 635.63: 632.4
***Mycosphaerella* black rot of cucurbits.**
J. agric. Res., 1945, **71**: 193-213, bibl. 37.
An illustrated account is given of the development of *Mycosphaerella citrullina* on cucurbits and its behaviour on culture media. Suggested measures for control of this serious shipping and market disease include seed treatment and spraying, avoidance of injuries in picking and packing, quick handling after picking, precooling to approximately 50° F. and maintenance of temperature at 40° to 45° F. during transit to market.

1796. ČESNOKOV, V. A., BAZYRINA, E. N., AND KUBLI, M. G. 635.63: 631.589: 663.61
Water cultures trials with cucumber. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 3, pp. 25-7.
Describes the successful cultivation of cucumbers in water cultures. As in similar experiments with tomatoes special care must be taken to prevent the desiccation of the region where the stem and root system join.

1797. GOULD, G. E. 635.63: 632.76
The biology and control of the striped cucumber beetle.
Bull. Ind. agric. Exp. Stat. **490**, 1944, pp. 28, bibl. 65.
The striped cucumber beetle, *Diabrotica vittata*, whose biology and habits were studied, is the most important pest of cantaloupes, cucumbers and watermelons in Indiana, causing severe losses practically every season. The beetle's preference for wilted plants increases its damage by spreading bacterial wilt infection. The best control in the field was obtained by a mixture of 20% calcium arsenate plus enough insoluble copper compound to analyse 3% metallic copper plus an inert carrier, such as pyrophyllite or talc, to make 100%. Eight applications at specified intervals from the day the seedlings emerge are necessary to render the treatment effective. The Tachinid fly *Chaetopheps setosa* made a contribution to its control by killing 10-30% during the summer months.

1798. HARGRAVE, J., MORRIS, J. W., AND MCKENZIE, W. F. 635.64
Outdoor tomato variety trials.
Kirton agric. J., 1945, No. 10, pp. 41-4.
The results of 3 years' outdoor trials of tomatoes in Holland (Lincs.) are recorded. Harbinger and Potentate were outstanding for weight of crop ripened out of doors, Harbinger giving fruit of very fair quality. Stambovoi Alpapsev was found to suffer no less than the other dwarf varieties in the trial by damage from early frost.

1799. HUGHES, H. M. 635.64
Outdoor tomato trials, 1944.
A.R. East Malling Res. Stat. for 1944, **A28**, 1945, pp. 38-43, bibl. 3.
The plants for these trials were planted out during the first week of June at 18 in. apart in rows 3 ft. apart. As the soil was exceptionally dry the oscillating overhead irrigation system was used three times to supply the equivalent of 2 in. of rain over a three-weekly period after planting. The trial included four standard varieties and five "bush" varieties. It was found that the bush types need some form of training and support; their crop records showed that they compare favourably with standard varieties. Pot-raised plants gave heavier and earlier yields than tray-raised plants. Much splitting and blotchy ripening of the fruit was noted.

1800. WALKER, W. F., AND PIERCE, K. W. 635.64
Tomato production investigations, 1943-44.
Tasm. J. Agric., 1944, **15**: 71-82, bibl. 1.
The chief object of the investigation is to select tomato varieties for processing most economically suited to the Tasmanian district concerned. Some fifty-odd varieties, most of them grown in the State for the first time, were tested under field conditions throughout Tasmania in 1943-44. Owing to the occurrence of late spring and sometimes of early autumn frosts in some parts of the country only those varieties are suitable which will produce a maximum yield in a relatively short growing season. So far, Rouge de Marmande, Bounty and Burwood 41, all of the dwarf to medium vigour type and with compact or decumbent habit of growth, have shown the highest yielding capacity for the last 3 years, the optimum number of plants per acre being 6,000-8,000. Other promising varieties,

tested only for one season, are named. The tabulated results include data on vitamin C tests of canned tomato samples and on the increase in fruit yield due to reselection in Bounty, Burwood 41 and Rouge de Marmande.

1801. YOUNG, R. E. 635.64
Trellis tomatoes.
Bull. Mass. agric. Exp. Stat. **419**, pp. 19.
The shift from flat tomato culture to trellis, which started about 1930, is still continuing in Massachusetts. On the basis of 4 years' experiments growers are given detailed advice, which includes the following points: (1) On fertile soil apply 10-12 cords of manure and 1 ton of a 5-8-7 fertilizer per acre, adding ½ ton superphosphate if fertility is low. (2) Broadcast the fertilizer; experiments showed that row application is not profitable unless it can be done by machinery. (3) In very wet years and on light soils top-dress with nitrate of soda at the rate of 300 lb. per acre. (4) On high-priced land train to a single stem to obtain highest yields per acre, on other land use 2 stems to obtain highest yields per plant. Space 1 foot and 22 in. respectively in rows 4 feet apart. The following figures indicate the effect of trellising on yield in pounds per acre: Double-stem trellis: total crop 45,297, early crop 9,899; flat grown: 36,650 and 3,850 respectively.

1802. DAVENPORT, N. 635.64
Tomato culture in the Geraldton District.
J. Agric. W. Aust., 1944, **21**: 299-308.
In the Geraldton District of Western Australia the tomato crop is marketed in winter from June to November, i.e. a period when supply is short elsewhere, commercial production being limited to an area within approximately 10 miles of the coast and to certain frost-free regions further inland. The most popular variety in the district is the early maturing, high yielding Geraldton Smooth Skin, which has been developed locally. Seed is harvested by the growers themselves, seed beds are in the open and the plants are staked. Details of cultural practice under local conditions, including pest and disease control, are given. Tomatoes are usually grown in a 4-year rotation, following peas or beans, cereals and fallow. Early blight (*Macrosporium solani*) is the most important disease.

1803. HANCOCK, W. G. 635.64: 631.67
Tomato growing in the Bowen district.
Qd agric. J., 1945, **60**: 221-4.
The Bowen district, North Queensland, is taken as typical of a low-rainfall area within the tropics, where tomatoes are produced under irrigation in winter from July to October. Other regions in North Queensland with similar conditions prevailing are along Euri Creek and around Guthalungra and Gumlu. The tomato variety almost exclusively grown is the locally developed Buckeye-Globe, but in future the introduction of mechanical equipment may render the planting of less vigorous varieties desirable. At present, growing on the ground is the standard practice. Foliage diseases do not cause much trouble. Cultural practices to suit local conditions are recommended.

1804. MORGAN, C. N. 635.64: 631.531
Tomato seed-beds.
Qd agric. J., 1945, **60**: 273-6.
The raising of tomato seedlings in open beds is described, this being the customary method under the favourable climatic conditions of North Queensland.

1805. WALKER, W. F. 635.64: 631.531
Extraction of tomato seed by the acid method.
Tasm. J. Agric., 1944, **15**: 110-3, bibl. 1.
The method of extracting tomato seed from the pulp by means of hydrochloric acid (see *J. Coun. Sci. industr. Res. Aust.*, 1943, 16: 97-103; *H.A.*, 13: 1417) has given very satisfactory results when tested for 2 seasons by the Department of Agriculture in Tasmania. The detailed description of the process followed and of the utensils used includes recommendations on seed disinfection (in 1-3,000 solution of bichloride of mercury) and on seed drying.

1806. MAKSIMOV, B. 635.64
A new method of growing tomato plants for transplanting. [Russian.]
Sovhoznoe Proizvodstvo (State farming), 1944, No. 3, pp. 28-9.
A method of raising tomatoes is reported whereby seedlings are pricked out in frames and are sparingly lighted and watered for 25 to 35 days. At the end of this period the dwarfed plant will have formed 7 or 8 leaves and reached the flower-bud stage. They are then forced into growth by liberal watering and manuring until ready to be planted out. Results claimed are economy of space and earlier ripening.

1807. DANILENKO, A. D. 635.64: 631.67
Methods of furrow-irrigation of tomatoes. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 3, pp. 21-2.
This is a comparison of the results of irrigating outdoor tomato plants by means of long (50 metres) or short (10 m.) furrows, showing to the advantage of the former.

1808. ČESNOKOV, V. A., AND OTHERS.
635.64: 631.589: 663.61
A water culture trial with tomatoes. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 3, pp. 23-5.
The author concludes from the experiments described that growing tomato plants in water culture presents no special difficulties. It is essential, however, to protect that region of the stem bordering on root and stem from drying out, by providing the containers with thick wooden covers. Knop's fluid at double strength at pH 5·9-6·2 was found to be a suitable liquid medium.

1809. SWARBRICK, T. 635.64: 581.163
Parthenocarpic production of tomato fruits.
Nature, 1945, **156**: 300-1, bibl. 5.
Two completely new lines of investigation have recently been initiated in experiments at Long Ashton Research Station to induce parthenocarpy in tomatoes: (1) It has been found in preliminary trials that 4-4′ dihydroxydiethyl stilbene (stilboestrol) will cause parthenocarpic development of tomato fruits at 50-100 p.p.m. Hexoestrol has also been shown to be active in this direction and it is hoped that a chemical theory of the phenomenon may be provided by further substitutions within this molecule. (2) A 100% fruit set has been induced in tomato flowers deflorated a fortnight earlier by spraying with a dried ether extract of tomato flowers (removed just prior to anthesis) taken up with absolute alcohol and diluted with water. The extract, to which ether salts were added to provide adequate wetting properties, proved effective in 3 concentrations tested. In a third experiment a number of apple and pear trees, whose crops had suffered severe frost damage on 30 April-1 May, 1945, were sprayed on 8 May with a mixture of growth-promoting substances known to be active on tomato. Conference pear and Miller's Seedling apple responded to the treatment, the fruits being still on the tree at the time of writing (16 June) and showing appreciable swelling, while all the fruits from sprayed Cox's Orange and unsprayed Miller's Seedling trees fell off. [By mid-July they had stopped growth but were still firmly attached to the trees.—ED.] It may be expected that in further experiments materials will be found which are fully effective in inducing parthenocarpy also in apples and pears.

1810. SWARBRICK, T. 635.64: 577.15.04
The use of growth-promoting substances as a means of inducing fruit set and development in the tomato.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 36-48, bibl. 6.
In experiments at Long Ashton α-naphthaleneacetic acid

failed to induce development of parthenocarpic fruit in tomatoes. Both β-naphthoxyacetic acid (N.O.A.) at 30 p.p.m. and 2-4 dichlorophenoxyacetic acid (2-4D) as weak as 1 p.p.m. induced the development of fruits from emasculated tomato flowers. The stimulation was achieved by both substances after a delay of about 3 weeks between emasculation and treatment. 2-4D is the most effective, but if used too strong it results in malformation. N.O.A. shows no such effects up to 50 p.p.m. The best time for application is within a few days of full bloom. Chemical analysis failed to discover significant difference between normal pollinated and artificially produced fruits in sugar, acidity or vitamin C content. But whereas to the palate fruits produced by N.O.A. were almost normal in flavour, texture, etc., those from 2-4D were insipid, rather sweet, mild in flavour with a loose, mealy flesh texture. N.O.A. fruits were practically normal in shape and were filled with mucilage, whereas 2-4D fruits were elongated, beaked and often partially hollow.

1811. STRONG, M. C. 635.64: 577.15.04
Improvement of greenhouse tomato production by use of vaporous beta naphthoxyacetic acid.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **27**: 225-36, bibl. 5.

It had been shown that β-naphthoxyacetic acid vapour applied in an airtight greenhouse increases both size and percentage of set in tomatoes. It was the object of this investigation to determine the optimum concentration. The vapour was produced by warming weighed amounts of the ethyl ester of this acid on an electric hot plate, an electric fan being located about 6 feet away. The hot plate was allowed to run for 30 minutes and the fan for 2 hours. The results of the tests indicate that 10 milligrams of the growth regulator per 1,000 cubic feet for 15 hours is the optimum dosage. As the treatment is not so effective upon old flowers or buds, 2 applications during the blooming period at a 5-day interval gave the best results, viz. an increase in yield of 15% over hand-pollinated controls. High concentrations of the vapour were found to injure the plants. It is a serious defect of the chemical that the treatment fails to stimulate the complete filling of 10-15% of the locules when applied during the period of short daylight, i.e. at a time when the pollen is often not viable. The search for another volatile growth regulator continues. Growers are warned that β-naphthoxyacetic acid vapours are applicable only in a relatively airtight greenhouse, as deviations from the optimum dosage are either injurious or ineffective.

1812. JUDKINS, W. P. 635.64: 577.15.04
The extraction of auxin from tomato fruit.
Amer. J. Bot., 1945, **32**: 242-9, bibl. 17.

A method is described for the rapid drying (in test tubes) and complete recovery of organic solvent extracts of auxin. The use of ethanol as a solvent in the extraction of auxin from fresh tomato tissue gave higher yields than ether, acetone, methanol, dioxane, or ethyl acetate. A number of successive extractions of the same sample of tissue are necessary to secure all the extractable auxin. The highest yields of auxin were obtained during the period of most rapid increase in fruit size. This condition is the same for the three tomato varieties used, namely Stone, Mingold, and Sugar. [From author's summary.]—Ohio Agricultural Experiment Station.

1813. POLLARD, A., KIESER, M. E., AND BRYAN, J. D. 635.64: 577.16
Factors influencing the vitamin C content of tomatoes.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 171-9, bibl. 9.

The authors summarize the results of their 1944 trials as follows:—"The ascorbic acid content of tomatoes varies from plant to plant within a variety, but in the autumn season no significant differences were found to be due to truss position. Fruit grown in the open air had a higher ascorbic acid content than that grown under glass. The application of organic compost gave fruit with a slightly lower ascorbic acid content, but no significant differences were observed in the other constituents. Tomatoes ripened in the light after picking contained slightly less water and sugar than fruit ripened on the plant, but the ascorbic acid content remained unchanged. Fruit of the variety Ailsa Craig had a higher ascorbic acid content than fruit of Market King, both in the open air and under greenhouse conditions."

1814. COOK, L. J. 631.8: 633.491 + 635.64
Manurial experiments with potatoes and tomatoes at Birdwood, 1937 to 1943.
J. Dep. Agric. S. Aust., 1945, **48**: 291-3.

The results of commercial manurial experiments with tomatoes show that under irrigation at Birdwood, South Australia, a 5: 1 fertilizer mixture of superphosphate and sulphate of ammonia is more productive and more economical than bonedust, a mixture of crushed rock phosphate or sulphate of ammonia or superphosphate applied by itself. The fertilizer was used at the rate of approximately 1 ton per acre.

1815. JONES, J. O., AND OTHERS. 635.64: 632.19: 631.811.6
Experiments on the control of magnesium deficiency in glasshouse tomatoes. Progress report II.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 61-71, bibl. 1.

In these experiments continued at 4 centres soil dressings of 10 cwt. per acre magnesium sulphate (30% MgO) were necessary to achieve satisfactory commercial control of magnesium deficiency symptoms in tomatoes. Increasing the dressing above this did not increase the effect. Liquid dressings of the soil during the growing period at a total rate of 5 cwt. per acre were relatively effective. Sprays were much more effective than soil treatment and complete control was obtained in several cases by 3 or 4 sprayings during the growing season, using total amounts of 1½ and 5 cwt. (30% MgO) magnesium sulphate in different cases. Chemical data on leaves from the mid-stem region suggest a value of 0·50% MgO in dry matter as a threshold value between sufficiency and deficiency of magnesium.

1816. ABERDEEN, J. E. C. 635.64: 632.3/4 + 632.8
Diseases of the tomato and their control.
Qd agric. J., 1945, **60**: 277-99.

This survey covers the more common tomato diseases, among which target spot (*Alternaria solani*) causes the highest losses in Queensland.

1817. STRONG, M. C. 635.64: 632.19: 634.51
Walnut wilt of tomato.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 194-5, bibl. 5.

It is estimated that 50% of the cases of tomato wilt reported in Michigan during the 1943 season were due to an association of *Juglans nigra* with this crop rather than to pathogens. The wilting effect is produced by a toxic principle, juglanone, in the black walnut roots, the symptoms being similar to those of bacterial or *Fusarium* wilt. Cutting down of the black walnut trees is no remedy as long as the roots remain in the soil. Other plants observed to be susceptible are: hydrangea, lilac, chrysanthemum, sugar beet, asparagus, sweet cherries. A list of 17 vegetables and flowers, which have shown no injury when grown close to black walnuts, is also given.

1818. KALAČNIKOV, K. JA. 635.64: 632.19
Leaf curl of tomatoes. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 7, pp. 25-6.

The author considers that leaf curl in tomatoes is not

infectious and is not transmitted by the seed, but that it is a reaction of individual plants to the conditions under which they are growing. He recommends, however, that seeds be taken only from plants that are quite healthy or show only a trace of curl.

1819. WHITE, N. H. 635.64: 632.8
Virus diseases of tomatoes.
Tasm. J. Agric., 1944, **15**: 37-44.
The most injurious virus disease of tomatoes in Tasmania is spotted or bronze wilt, but damage is also caused by gem leaf, streak and big bud, apart from some other diseases of minor importance. Symptoms, preventive measures and other aspects of these diseases are discussed.

1820. STRONG, M. C. 635.64: 632.411
Testing copper fungicides for the control of tomato blight.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 353-62, bibl. 5.
Although applications of bordeaux against *Alternaria solani*, *Phytophthora infestans* and *Septoria lycopersici* caused the least defoliation of tomato plants, such fungicides as Bordow (12½% and 25%) and Cuprocide Y resulted in somewhat higher yields. This shows that defoliation is not the only factor influencing fruit production, but that defloration also, which was found to be more severe with bordeaux than with some other fungicides, plays a major role. The durability and adherence qualities of bordeaux were superior to those of other copper-containing sprays. The economic advisability of spraying must be judged each year by the standard of market prices. Growers are warned that in a dry season the application of copper fungicides is not only wasteful but harmful, as transpiration is increased. For the same reason young plants in the seedbed should not be sprayed or dusted later than 7 days before transplanting. The importance of sanitary measures and of avoiding potatoes, peppers and eggplants in the rotation is also mentioned.

1821. HENDERSON, R. G. 635.64: 632.411
Testing of copper fungicides for control of tomato blight in southwest Virginia.*
Tech. Bull. Va agric. Exp. Stat. **89**, 1943, pp. 18, bibl. 13.
It is concluded (1) that the yield and quality of marketable fruit on tomatoes in southwest Virginia can be greatly increased by 4 to 6 applications of a copper fungicide; (2) that copper oxide and tribasic copper sulfate applied either as a dust or as a spray give a marked degree of control of tomato leaf blight but are not as efficient as bordeaux spray in a rainy season; (3) that bordeaux delays the date of the harvest peak of fruit to a much greater extent than either copper oxide or tribasic copper sulfate; and (4) that the control of blight is more difficult on early maturing varieties like Earliana, in a season favorable for disease development than on later maturing varieties. [Author's summary.]

1822. ALIMBEKOVA, M. G. 635.64: 632.19
Blossom-end rot of tomatoes and its control. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 5, pp. 29-31.
Observations on the blossom-end rot of tomatoes in the suburbs of Gorki showed that the disease was caused by unfavourable weather and cultural conditions. High temperatures and a dry atmosphere favoured the disease. In an experiment, carried out at the time of maximum blossoming, daily watering resulted in less of the disease than watering at intervals of 2, 3 or 4 days. Ailsa Craig and Radio are two of the more resistant varieties.

* See also *H.A.*, 15: 732.

1823. CROXALL, H. E. 635.64: 632.952.2
The effects of copper sprays on marketable yield and storage rots of outdoor tomatoes.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 161-6, bibl. 1.
A detailed account is given of a spraying trial on outdoor tomatoes using copper oxychloride at intervals of 1, 2 and 4 weeks and copper sebacate at intervals of 2 and 4 weeks. No blight occurred in any plots, treated or untreated. The results of the methods and the possible control of *Didymella* infection by spraying are discussed. The methods tried do not offer an economic control of *Didymella* and *Botrytis* rots.

1824. PEIRIS, J. W. L. 635.64: 632.8
A leaf curl disease of tomato and its relation to some other plants.
Trop. Agriculturist, 1944, **100**: 14-9, bibl. 8.
1. A leaf curl disease of tomato characterised by the abaxial curling, bronzing and glossiness of leaflets is described and is found to be associated with a species of mite. 2. Inoculation with mites from diseased to healthy plants resulted in reproducing the malformation. 3. The disease is communicable to other plants. 4. Sulphur dusting or use of a sulphur spray was effective in controlling the disease. [Author's summary.]

1825. TAYLOR, G. G. 635.64: 632.411
Bordeaux mixture, copper oxychloride, and copper oxide sprays for control of late-blight (*Phytophthora infestans*) of tomatoes.
N.Z. J. Sci. Tech., 1945, **27**, Sec. A, pp. 9-13.
Up to now tomato growers in Auckland, New Zealand, have not been able to control the heavy attacks of late-blight usually associated with wet seasons in that district. From experiments undertaken to work out an effective spray programme the following results are reported: Adequate control of the disease is obtained by regular heavy applications of a 3-4-50 bordeaux mixture or a Cuprox (copper oxychloride) spray at 5 lb. per 100 gal. The latter has the advantage of having no depressing effect on yields. Also plants treated with Perenox (cuprous oxide and cupric oxide) remained free from damage, but time available and limitations of supply excluded this chemical from further trials. Additional work is required to determine optimum dosage and timing of applications.

1826. OGILVIE, L. 635.64: 632.4
Seed infection as a cause of outbreaks of *Didymella* stem-rot of tomato.
Gdnrs' Chron., 1945, **118**: 71-2, bibl. 5.
The author's experiments show that a small percentage of diseased seedlings originating from infected seed is sufficient to cause a new outbreak of *Didymella* stem-rot of tomato. Dying seedlings contaminate the soil, thus producing secondary infection of older plants at soil level. Apparently, infected seeds may also spread the fungus in the soil without symptoms becoming visible on the seedlings. Since most fruits of outdoor tomatoes, at least in the south-west of England, are infected with *Didymella lycopersici*, healthy greenhouse fruits should constitute the only source of seed.—Long Ashton.

1827. WALLACE, J. C. 635.64: 632.4
***Didymella* stem rot of tomato.**
Kirton agric. J., 1945, No. 10, pp. 21-3. (Cheshunt.)
***Didymella* stem-rot of the tomato.**
Circ. Cheshunt exp. Res. Stat. **15**, revised 1945, pp. 5.
A full account is given of a serious disease which has become more widespread with the increase in tomato cultivation in England, especially in the open, in the war years. Much of the fungal hyphae of *Didymella* grows within the tissues of the host and is therefore extremely difficult to deal with. So far control is of necessity based entirely on measures

designed to prevent attack. Control measures, which are largely hygienic, being aimed at the elimination of sources of infection, are set out in detail in these articles, being slightly altered in the revised Cheshunt bulletin.

1828. WEBSTER, G. T. 635.65
Nebraska outstate crops and soils tests. Variety tests for 1944.
Bull. Neb. agric. Exp. Stat. **372**, 1945, pp. 38.
The results of soybean, field bean and flax variety tests are included.

1829. TASMANIA HORTICULTURAL DIVISION. 635.65
Bean trials, 1943-44.
Tasm. J. Agric., 1944, **15**: 94-7.
Salient features of recent French bean variety trials carried out in various districts are reviewed. Brown Beauty, Canadian Wonder, Hawkesbury Wonder, Stayley's Surprise, Wellington Wonder and Clarendon Wonder gave very promising results. In the past season, late October and early November sowings proved the most successful. The stringless beans and wax pods gave disappointing results and further work is necessary. Hawkesbury Wonder, Clarendon Wonder and the Navy beans were particularly resistant to halo blight. Irrigation is a necessary insurance against crop failure and can be utilised with advantage even under normally favourable conditions. [From author's summary.]

1830. KERR, J. A. 635.65
Navy bean production in Queensland.
Qd agric. J., 1945, **60**: 133-6.
Navy bean production in Queensland, begun in the 1941-42 season, has been a great success. The recommendations made on varieties, soils, planting, cultivation, harvesting and marketing incorporate the experiences of the last 5 seasons. In respect of bean fly attack it is suggested that in such districts as the South Burnett, where other bean crops are not extensively grown, early planting should be avoided.

1831. PETTIGROVE, H. R. 635.65: 631.55
Beans, bean straw and bean pods.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **20**: 233-4.
Data are presented in 2 tables on (1) yields of entire bean plants, beans, straw, pods and stems from various sized bean vines. Between 56% and 62% of the bean plants as harvested at maturity are beans. The smaller plants produce a higher percentage of pods but a lower yield per acre.

1832. SMITH, W. P. C. 635.65: 632.8
The bean mosaic menace.
J. Agric. W. Aust., 1945, **22**: 20-5.
Since during the war competent growers of French bean seed in Western Australia were tempted by high prices to sell green beans and growers had to raise their own seed, bean mosaic has spread at an alarming rate. Steps have now been taken to produce disease-free seed under Departmental supervision. Meanwhile, growers are instructed how to fill the gap and raise healthy seed of their own by delaying planting until the advent of warmer weather in early summer (when the aphids subside) and by frequent roguing, by which halo blight-infected plants should also be eliminated.

1833. ZAUMEYER, W. J., AND GOLDSWORTHY, M. C. 635.65: 632.4
Control of bean rust by fungicide dusting and spraying.
Abstract in *Phytopathology*, 1945, **35**: 489.
Sulphurs (wettable and liquid), dithiocarbamates, and chlorinated naphthoquinone were highly efficient in greenhouse experiments in the control of rust infections. Liquid lime-sulphur, chlorinated naphthoquinone (604), and disodium ethylene bisdithiocarbamate (Dithane) proved specially effective in eradicating the fungus from infected bean plants (24-hour infection). In field studies, dusting with finely ground (325-mesh) sulphur at the rate of 20-25 lb. of sulphur per acre, before and immediately following the field observations of primary rust infections, controlled the disease.

1834. CALDWELL, N. E. H. 635.65: 632.6/7
Bean pests in Queensland.
Qd agric. J., 1945, **60**: 156-71.
Life history, symptoms caused by and control of the following bean pests are described: Bean fly, bean aphid, bean thrips, bean pod borer, corn earworm, bean flower caterpillar, green looper caterpillar, green vegetable and other shield bugs, pod-sucking bug, leaf miner, red spider, nematodes and bean bruchids. In conclusion, the control measures suggested for the more important pests are summarized.

1835. BRANNON, L. W. 635.65: 632.76
Control of Mexican bean beetle and corn earworm in the presence of powdery mildew on snap beans.
J. econ. Ent., 1945, **38**: 101-2, bibl. 5.
The results of the experiment indicate that in instances where Mexican bean beetle and corn earworm infestations occur in association with powdery mildew disease on snap beans, cryolite should be used in preference to derris for the combined control of the two insects, and sulfur should be used as a diluent for the dust (or in combination with the spray) in preference to talc or other diluents for its value against mildew. In case the corn earworm is not present, a derris-sulfur dust or spray may be substituted for cryolite. [Author's summary.]

1836. SUN, Y.-P. 635.65: 632.753
Effect of rotenone and Velsicol (AR-60) dusts on the control and reproduction of bean aphids.
J. econ. Ent., 1945, **38**: 124-5, bibl. 4.
In the laboratory tests of insecticides it was found that rotenone-talc dusts stimulate the reproduction of bean aphids, *Aphis rumicis* L., while Velsicol (AR-60) [methylnaphthalenes]-talc dusts tend to inhibit their reproduction. This finding may explain the ineffective and unreliable results in the field control of some species of aphids with rotenone products. [Author's summary.]—Cornell University, Ithaca, N.Y.

1837. JENSEN, J. H. 635.651
The Scottsbluff Pinto bean.
Circ. Neb. agric. Exp. Stat. **78**, 1944, pp. 6.
The Scottsbluff Pinto bean was produced at the Nebraska Agricultural Experiment Station by crossing Common Pinto with Great Northern. The new variety, which is described as early, vigorous, an excellent yielder and of high quality, proved its worth under both dry-land culture and irrigation.

1838. CHEO, C. C., AND JENKINS, A. E. 632.4: 635.654+633.88.32.491
***Elsinoë* and *Sphaceloma* diseases in Yunnan, China, particularly hyacinth bean scab and scab of castor bean.**
Phytopathology, 1945, **5**: 339-52.
The symptoms of the two diseases are described; the organism causing scab of hyacinth bean (*Dolichos lablab* L.) has been given the name *Elsinoë dolichi* Jenkins, Bitanc. and Cheo, and that from castor bean (*Ricinus communis* L.) is named *Sphaceloma ricini* Jenkins and Cheo.

1839. OLIVE, L. S., BAIN, D. C., AND LEFEBVRE, C. L. 635.655: 632.4: 633.33+635.655
A leafspot of cowpea and soybean, caused by a new species of *Helminthosporium*.
Abstract in *Phytopathology*, 1945, **35**: 488.
A new species of *Helminthosporium* has been found to cause spotting of cowpea leaves in Louisiana and of cowpea and

soybean leaves from North Carolina, South Carolina and Florida. The common name, target-spot, has been applied to the disease because of the concentric zonation in each leafspot on the cowpea, the chief host.

1840. SIERRA, H. M. 635.655
Cultivo de la soya. **(The cultivation of soybean.)**
Rev. agric. Guatemala, 1944-45, **1**: 45-51, 107-14.
This is an article in a " Course of Cultivation ", a series of papers, relating to special crops grown in Guatemala, intended to give growers reliable information regarding the crops. The present article deals with the soybean, its history, a general description of the plant (*Glycine hispida*), and varieties and types. A long list of varieties with a description of each, groups them into three types—forage plants, those for industrial processes (particularly for the extraction of oil), and those grown for human consumption.

1841. HOLLAND, C. A. 635.656: 664.84.656
Green peas for canning.
Tasm. J. Agric., 1944, **15**: 45-6, 60.
On the basis of observations in New South Wales and of Departmental trials, which have been conducted in various localities on the Northwest coast of Tasmania, cultural recommendations are made concerning the new and expanding industry of growing peas for canning in the State. In sowing trials the growing period varied from 127 days with early sowings to 47 days with late sowings.

1842. HOLLAND, C. A. 635.656
Production of green peas for canning.
Tasm. J. Agric., 1945, **16**: 33-8.
A discussion of the lessons learned in Tasmania from the first season's growing of green peas for canning. There is every reason to suppose that the industry will become permanently established in the State, entailing pea production on a large acreage.

1843. RAPHAEL, T. D. 635.656
Green pea trials.
Tasm. J. Agric., 1944, **15**: 122-4, bibl. 4.
A progress report of the performance of a number of pea varieties under Tasmanian conditions.

1844. VINCENT, V., BOISCHOT, P., AND HERVIAUX, J. 635.656
La culture des petits pois de conserve dans le Finistère. **(The cultivation of peas (petits pois) for canning in Finistère.)**
Ann. agron. Paris, 1942, **12**: 565-99.
This treatise on the production of canning peas deals with the chemistry and nutrition of the peas during growth, the qualities required in canning peas, methods of cultivation, market requirements and how fulfilled by different varieties, manuring and its effects, use of residues.—Station agronomique de Quimper.

1845. DAVIS, J. F., AND COOK, R. L. 635.656: 631.8
Fertilizers for cannery peas.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 200-7.
The results of trials regarding the placement of fertilizers on cannery peas—an important crop in Michigan—indicate that the optimum method of application would be ½ in. to the side of the seed and 1½ in. or more below. However, as long as there are no machines available for placing the fertilizer in this manner, it should be drilled in 3 in. deep or more just prior to planting. The fertilizer must not come in contact with the seed and must not be stirred up after it is drilled into the soil. The composition of the fertilizer recommended is 0-20-10, to be applied at the rate of 300 lb. per acre. In the absence of livestock and on lighter coloured soils a complete fertilizer (2-16-8; 2-12-6; 4-16-4) was found to be preferable.

1846. WHITE, N. H., AND RAPHAEL, T. D. 635.656: 632.4 + 632.8
The reaction of green pea varieties to downy mildew and two viruses.
Tasm. J. Agric., 1944, **15**: 92-3, 97, 104.
The resistance under field conditions of 33 green pea varieties to downy mildew (*Peronospora pisi*), *Pisum virus* 2 and *Enation virus* is recorded. The varieties under observation were found to range from susceptibility to resistance to all 3 diseases. It is proposed to make a fuller study of the effect on yield of the diseases in question.—Summerleas Experimental Station.

1847. DITMAN, L. P., AND OTHERS. 635.656: 632.753
DDT aerosols for pea aphid control.
J. econ. Ent., 1945, **38**: 183-8, bibl. 10.
DDT aerosols were very successful against pea aphid (*Macrosiphum pisi*). They compare favourably in cost with standard treatments and need only very simple equipment.

1848. TUCKER, C. M., AND ROUTIEN, J. B. 635.8: 632.8
The mummy disease of the cultivated mushroom.
Res. Bull. Mo. agric. Exp. Stat. **358**, 1942, pp. 27, bibl. 5.
The mummy disease of cultivated mushrooms was first observed in Missouri in 1935 and has since caused serious losses to growers in the state. Symptoms, which are fully described and illustrated, consist of abnormal sporophores with elongated, slender stipes and small, tilted pilei in the early stages, while in a more advanced condition the development of the sporophores is arrested in the button stage. A causal agent has not been discovered, and the only means of transmitting the disease was by transfer of soil from affected to normal beds. Treatment of diseased beds has been unsuccessful, but it was possible to stop the progress of the infection by mercuric chloride barriers or, better, by narrow trenches, 6-8 feet in advance of sporophores showing symptoms. It was found that soil treatment such as drying or heating, which killed the mushroom mycelium, would probably render soil or compost non-infectious. Possibly, the disease is caused by a virus spreading by anastomoses from affected to healthy hyphae.

1849. KRUPENIKOV, I. A. 635.937.34: 631.415.3
Response of certain wild-rose species to high salt concentrations in soils.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 162-4.
Data are presented on the salt resistance of *Rosa glabrifolia*, *R. laxa* and *R. acicularis* in the forests of the southernmost part of the northwestern Kazakhstan. The salt-resistance of the species was found to be inversely related to their drought-resistance.

1850. NOVIKOV, V. A. 667.211.4
Stimulation of the resting seeds of *Polygonum bucharicum*.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 204-6, bibl. 3.
A treatment is described by the application of which 35% of *Polygonum bucharicum* [a valuable tanning plant] seeds gain germination capacity.—Agricultural Institute, Tashkhent.

1851. IVANOV, V. V. 636.085.2: 589.514
***Solanum nigrum* L. as a food plant.** [Russian.]
Sovetsk. Botan., 1944, No. 2, pp. 40-5.
Despite its reputation as a poisonous plant the leaves and berries of *S. nigrum* have been used as a food by man. Among the investigations carried out at Uralsk, it was shown that the berries contained no solanin and are incidentally rich in vitamin C. The species grows on most types of soil, being particularly partial to sandy soils rich in organic and nitrogenous matter, and containing sufficient moisture. Details of cultivation, harvesting and preparation for human consumption are given.

1852.

a AITKEN, Y., AND HAUGHTON, J. M. 635.656
The species *Pisum sativum* in relation to Australian agriculture.
J. Aust. Inst. agric. Sci., 1945, **11**: 35-40, bibl. 10.

b ANON. 633.85
Conseils pratiques sur la culture du ricin. **(Castor oil bean production in Algeria.)**
Bull. inspect. gén. Agric. algér. **52,** 1941, pp. 2.

c ANON. 633.52+633.522
Anleitung für den Anbau von Flachs und Hanf. **(Introduction to the cultivation of flax and hemp.)**
Mitt. eidg landw. Versuchsanst. Zürich Oerlikon, 1943, pp. 8.

d ANON. 633.85
Anleitung für den Anbau von Raps (Kabisreps, Lewak) und Mohn. **(Cultivation of rape and poppy for oil.)**
Mitt. eidg. landw. Versuchsanst. Zürich Oerlikon, undated, pp. 4.

e APPLE, S. B., AND BARRONS, K. C. 635.31
Asparagus production in Michigan.
Circ. Bull. Mich. agric. Exp. Stat. **194,** 1945, pp. 23.

f BABB, M. F., AND QUAYLE, W. L. 635.1/7
Vegetable culture and varieties for Wyoming.
Bull. Wyo. agric. Exp. Stat. **250** 1942, pp. 40.

g BOISCHOT, P., HURIEZ, H., AND HERVIAUX, J. 633.12
La culture du sarrasin. **(The cultivation of buckwheat.)**
Ann. agron. Paris, 1943, **13**: 130-5.

h BOSHART, K. 633.83
Die Kultur der Gewürzpflanzen in Deutschland. **(The cultivation of spice plants in Germany.)**
Leistungssteigerung im Gartenbau **18,** pp. 68, from review *Forschungsdienst*, 1944, Vol. **14,** abstr. p. 31.

i BRAIN, E. D. 635.656: 581.14
Growth inhibition in pea seedlings.
Nature, 1945, **156**: 397, bibl. 6.

j VAN DEN BRUEL, W. E. 635.41: 632.654.2
Un ravageur de l'épinard d'hiver: *Tyroglyphus dimidiatus* Herm. (*longior* Yerv). **(A mite pest of winter spinach under glass.)**
Bull. Inst. agron. Gembloux, 1940, **9**: 81-99.

k CHESTER, K. S., AND MCLAUGHLIN, J. H. 635.1/7: 632.1/8
Recognition and control of vegetable diseases.
Circ. Okla. agric. Exp. Stat. **117,** 1945, pp. 16.

l EDDINS, A. H. 635.34-2.411 4
Control downy mildew of cabbage with Spergon and Fermate.
Pr. Bull. Fla agric. Exp. Stat. **589,** 1943, pp. 4.

m ESSIG, E. O. 633.913-2.753
A new aphid species on guayule [*C. californica* n.sp.] and notes on other species of *Cerosipha*.
Hilgardia, 1944, **16**: 177-84, bibl. 6.

n HANSEN, H. V. 633.52
Flax production in Southern Tasmania.
Tasm. J. Agric., 1945, **16**: 43-5.

o HARRINGTON, C. D. 635.656: 632.753
Biological races of the pea aphid.
J. econ. Ent., 1945, **38**: 12-22, bibl. 10.

p HEEGER, E. F. 633.88
Sortenkundliche Untersuchungen zur Kenntnis der deutschen Baldriansorten. **(Three German varieties of valerian.)**
Heil-u. Gewürzpfl., 1942, **21**: 1-35, from abstract *Forschungsdienst*, 1944, Vol. **17,** abstr. p. 34.

q HOLUBINSKY, I. N. 633.79-1.523
Meiotic abnormalities in hops induced by atmospheric electricity.
C.R. Acad. Sci. U.R.S.S., 1945, **46**: 247-9, bibl. 3.

r JARETZKY, R., AND BREITWIESER, K. 633.88
Untersuchungen heimischer Pflanzen auf ihre Eignung als Laxantien. VI. *Polyporus officinalis* Fr. und andere Pilze. **(German plants, which may be used as laxatives. VI. *Polyporus officinalis* and other fungi.)**
Dtsch. Heilpfl., 1944, **10**: 50-4, bibl. 21.

s KEYWORTH, W. G. 633.79-2.4
Three important hop diseases.
A.R. East Malling Res. Stat. for 1944, **A28,** 1945, pp. 130-4.
Reprint of a paper already noted (*H.A.*, 15: 1123).

t KIŠPATIC, J. 635.65: 632.451
Einleitende Versuche über Rassenbildung bei *Uromyces Fabae* (Pers.) de By. **(Preliminary experiments on the formation of biological races in *Uromyces fabae*.)**
Phytopath. Z., 1943, **14**: 475-83, bibl. 9.

u KNIGHT, G. D. 635.656: 632.1/8
Pea diseases in Idaho.
Bull. Idaho agric. Exp. Stat. **253,** 1944, pp. 13.

v LARSON, R. E., AND CURRENCE, T. M. 635.64: 631.523
The extent of hybrid vigor in F_1 and F_2 generations of tomato crosses. With particular reference to early yield, total yield and fruit size.
Tech. Bull. Minn. agric. Exp. Stat. **164,** 1944, pp. 32, bibl. 26.

w LINDÉN, S. E. 635.1/7: 658.8: 351.823.1
Köksväxtodlingens standardiseringsbestämmelser. **(Regulations governing the marketing of Swedish vegetables.)**
Fruktodlaren, 1943, No. 3, pp. 84-7.

x LIPŠIC, S. J. 633.913: 582
Contributions to a monograph on *Scorzonera*. [Russian.]
Part 1, Central Editorial Office of Chemical Literature, Moscow, 1935, pp. 164, and Part 2, Moscow Society of Naturalists, Moscow, 1939, pp. 168.

y MATTHEWS, E. M., AND HENDERSON, R. G. 633.71-2.4
Yellow Special tobacco, a new flue-cured variety resistant to black root-rot.
Bull. Va agric. Exp. Stat. **346,** 1943, pp. 7.

z NESBITT, L. L., AND OTHERS. 633.52: 633.854.54
Oil formation in flaxseed.
Tech. Bull. N. Dak agric. Exp. Stat. **323,** 1943, pp. 19, bibl. 17.

1853.

a NICHOLAS, D. J. D. 633.52: 581.192
The mineral element content of flax straw from experimental centres. Season 1943.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 98-100, bibl. 4.

b OPFER-SCHAUM, R., AND PIRISTI, M. 581.192
Zum Nachweis kleinster Nikotinmengen in pflanzlichem Material. **(The detection of small quantities of nicotine in plant material.)**
Dtsch. Heilpfl. 1944, **10**: 101-2, bibl. 9.

c E.H.G.S. 635.655
The development of the soya bean crop in the United States.
Bull. imp. Inst. Lond., 1945, **43**: 88-93, bibl. 11.

d SALLANS, H. R., BERENBOM, M., AND LARMOUR, R. K. 633.854.78-1.531
Canadian sunflower seed. I. Bushel weight as a factor in grading.
Canad. J. Res., 1945, **23**, Sec. F, pp. 91-103, bibl. 7.

e SAMSON, R. W., AND THOMAS, H. R. 635.64: 632.1/8
Tomato diseases in Indiana.
Circ. Ind. agric. Exp. Stat. **257**, 1940, pp. 35.

f SCHMIDT, H. W. 633.88-2.78
Kampf den Schädlingen deutscher Heilpflanzendrogen. (**The control of *Plodia interpunctella* in dried medicinal plants.**)
Dtsch. Heilpfl., 1944, **10**: 78.

g SHEAR, G. M. 633.71-2.19
Factors affecting physiological breakdown of maturing tobacco.
Tech. Bull. Va agric. Exp. Stat. **74**, 1941, pp. 16, bibl. 11.

h SHEN, T., HSIEH, K. M., AND CHEN, T. M. 635.655: 577.16
Effects of magnesium chloride and manganous nitrate upon the content of ascorbic acid in soybean during germination, with observations on the activity of ascorbic acid oxidase.
Biochem. J., 1945, **39**: 107-10, bibl. 3.

i SÖDING, H., KÖHLER, E., AND FUNKE, H. 633.491-2.8: 577.15.04
Über den Wuchsstoffgehalt abbaukranker. Kartoffelknollen. (**The growth substance content of potato tubers affected with virus diseases.**)
Phytopath. Z., 1943, **14**: 427-41, bibl. 6.

j TURNER, H. A. 635.13
Carrot growing [in Tasmania].
Tasm. J. Agric., 1944, **15**: 47-8, 61.

k WALKER, J. C., LEBEAU, F. J., AND POUND, G. S. 635.34: 632.8
Viruses associated with cabbage mosaic.
J. agric. Res., 1945, **70**: 379-404, bibl. 6.

l WHITE, N. H. 633.52-2.4
The relation of *Polyspora lini* Lafferty and *Pullularia pullulans* (de Bary) Berkh. to flax browning.
J. Coun. sci. industr. Res. Aust., 1945, **18**: 141-9, bibl. 9.

m WITKUS, E. R. 635.41: 576.35
Endomitotic tapetal cell divisions in *Spinacia.*
Amer. J. Bot., 1945, **32**: 326-30, bibl. 14.

FLOWERS AND ORNAMENTALS.

1854. UNDERHILL, G. W. 635.9: 632.6/7
Some insect pests of ornamental plants.
Bull. Va agric. Exp. Stat. **349**, 1943, pp. 38.
The following pests are dealt with: Juniper webworm, *Dichromeris marginellus*; Nantucket pine moth, *Rhyacionia frustrana*; euonymus scale (*Chionaspis euonymi*); arborvitae leaf miner, *Argyresthia thuiella*; boxwood psyllid, *Psylla buxi*; holly leaf miner, *Phytomyza ilicis*.

1855. SMITH, W. W., AND FLETCHER, H. R. 635.939.183
The genus *Primula*.
Trans. Proc. bot. Soc. Edinb., 1944, **34**: 55-158.
The *Primula* genus is considered under 5 sections, namely *Cortusoides*, *Malvacea*, *Pycnoloba*, *Dryadifolia* and *Capitatae*, the separate species being described in every case.

1856. HONEYWELL, E. R. 635.937.34
Roses.
Circ. Ind. agric. Exp. Stat. **216** (revised), 1943, pp. 16.
A brief discussion of the essentials of rose culture, the significance of which in America is evidenced by the fact that 11·21% of all nursery sales, including both ornamentals and fruits, is for roses.

1857. SMITH, A. G., Jr. 635.937.34
Experiments on the culture of hybrid tea roses.
Bull. Va agric. Exp. Stat. **334**, 1941, pp. 32, bibl. 51.
(1) Preparation of the soil to a depth of 20 inches gave better results than shallow working. (2) The hardy, vigorous growth obtained in these experiments is due primarily to the use of fertilizers very high in phosphate, high in potash, and low in nitrogen. (3) Ten inches of partly rotted manure worked into the lower soil to a depth of 20 inches produced more flowers than similar preparation without the manure. (4) Nothing was gained by using rocks, without an outlet, for drainage in the bottom of the trench. (5) The hilling of established hybrid tea roses for winter protection was found to be unnecessary. (6) The absence of a mulch during the winter did not result in damage to the plants. (7) Varieties with smooth green canes did not sun-scald during the winter as did those with rough, brown wood. (8) The so-called cankers were usually found on the south or southwest side of the canes. (9) The color of the foliage was rich and dark where no cultivation had been given for 3 years. (10) A mulch of sawdust or straw, applied in February, delayed spring growth and lessened the damage from late frost. (11) Sawdust, composed of two-thirds oak and one-third pine, applied as a mulch three successive years, did not increase the acidity of the soil. (12) Hybrid tea roses, pruned to a height of 18 to 24 inches, produced more flowers of better color than those pruned 6 to 12 inches. (13) Close planting (14 by 18 inches) reduced the number of leaves and flowers as compared with wider spacing (2½ by 5 feet) where high pruning was practised. (14) No material difference in the number of flowers or growth of plants resulted from the use of superphosphate as compared with bonemeal. (15) No effect was observed, due to the pH of the soil, on the growth of hybrid tea roses in these experiments. [Author's conclusions.]

1858. FRICK, L. 635.937.34: 632.4
Untersuchungen über Biologie und Pathogenität von *Diplocarpon rosae* (Lib.) Wolf. (**The biology and pathogenicity of *Diplocarpon rosae*.**)
Phytopath. Z., 1944, **14**: 525-91, bibl. 100.
Diplocarpon rosae, the causal organism of leaf blotch of roses, was shown to be a facultative parasite. Infection causes brown to black spots on rose leaves, up to 2 cm. in diameter, and may eventually lead to defoliation. According to the literature, which is reviewed, sulphur dusts are the most widely recommended, though not ideal, control measure. The interest of the author centres on biological and mycological problems.—Eidgen. Technische Hochschule, Zürich.

1859. HONEYWELL, E. R. 635.939.98
Aster culture.
Circ. Ind. agric. Exp. Stat. **200** (revised), 1941, pp. 23.
Artificial light supplementing daylight, five hours at night using lamps of 25 watts (one lamp per 16 square feet of bench space), made possible the production of a mid-winter crop of greenhouse asters of excellent quality. Artificial

lighting on aster seedlings immediately after germination resulted in as much as two weeks earlier flowering under field conditions. All varieties do not respond in a like manner to light treatment. Investigational work with more than 300 aster varieties and strains reveals that none is immune to *Fusarium* wilt, although some may show high resistance for one or more years. There are several strains of wilt of asters. Moreover, an aster strain which is highly resistant to *Fusarium* wilt in one locality may be very susceptible in another. Experimental work with asters substantiates the belief that they can be grown commercially in specially constructed cloth houses which aid in insect [and therefore virus] control. Asters grown in cloth houses are superior in quality to those grown in the open. Disease and insect control through prevention of infection and infestation is most effective. [From author's summary.]

1860. COOPER, G. J. W. 635.938.86
Fuchsias outdoors in New Zealand.
J. N.Z. Inst. Hort., 1943, **13**: 1-6.
The cultivation is described of fuchsias which in New Zealand are hardy out of doors almost anywhere in the North Island and in some warmer parts of the South Island. In warm sheltered positions the flowering period surpasses that of hydrangeas by 4 weeks. Forty-one selected varieties are listed and briefly characterized.

1861. SEEVERS, H. V. 635.939.124
Rhododendrons in Kansas.
Nat. hort. Mag., 1945, **24**: 223-4.
A method of soil preparation is suggested which makes it possible to grow rhododendrons and azaleas successfully in Kansas, although these plants will not ordinarily thrive in the mid-west. The soil on the site is excavated to a depth of 15 in. and the trench is filled with sawdust (preferably oak) to a level 8 in. higher than the surrounding soil level. If possible beds are made in the autumn to settle and decompose during the winter. In planting, the balls are held in holes excavated in the beds, then the balled soil is washed off, while the sawdust mixture is pressed around the exposed roots. When the first signs of growth appear, a light dose of fertilizer is given, with a heavy final application (cottonseed meal 5 parts, sulphur 1 part, 40% superphosphate 5 parts, ammonium sulphate 2 parts, potassium phosphate 4 parts) not later than 1 June. In autumn, the plants are mulched with 1 in. of sawdust and protected against heavy north winds by a screen of maize stalks. Two hundred and fifty rhododendrons and azaleas thus planted have withstood temperatures of —16° F. and over 100° F. practically without injury and are thriving to-day.

1862. SMITH, A. G., Jr. 635.944
Experiments on the culture of narcissus.
Bull. Va agric. Exp. Stat. **357**, 1943, pp. 16, bibl. 11.
Narcissus growing has been practised for decades in the vicinity of Gloucester, Virginia, but the importance of the industry has increased since in 1926 a federal quarantine on narcissus cut off European supplies. The results obtained in small-scale experiments indicate that (1) limited applications of lime are beneficial; (2) fertilizers containing superphosphate and potash without nitrogen plus 50-100 lb. per acre of a minor element mixture (64 elements) will produce an excellent quality of earliest flowers and bulbs; (3) a combination of bonemeal and potash was satisfactory, though the presence of bonemeal in a mixture makes for late flowers. The experiments are to be continued as soon as conditions permit.

1863. SLATE, G. L. 635.935.722
Minor species of Asiatic lilies.
Nat. hort. Mag., 1945, **24**: 228-37.
The article includes illustrations of *Lilium cathayanum*, *L. tsingtauense* and *L. medeoloides*.

1864. SMITH, K. M. 635.964: 632.8
Dahlias and the problem of virus infection.
Gdnrs' Chron., 1945, **118**: 140-1.
Very little work has been done in Great Britain on the viruses affecting dahlias. In describing the symptoms of the tomato spotted wilt virus, the cucumber wilt virus and the dahlia mosaic virus, as well as the possible methods of their control, the author summarizes our knowledge on the subject. He sums up his advice on the prevention and control of dahlia virus disease as follows: "(1) Keep down greenfly and thrips by means of nicotine in some form or other. (2) Build up a virus-free nucleus stock of dahlias by careful selection of young plants which show no rings or mottling on the leaves. (3) Isolate the dahlia stocks in a special glasshouse, if possible, and rogue and fumigate regularly throughout the season."

1865.

a CONNORS, C. H. 635.976.84
Growing holly.
Circ. N. Jer. agric. Exp. Stat. **493**, 1945, pp. 8.

b DAVIES, W. C. 635.976/977(931)
Native and exotic trees and shrubs at the Cawthron Institute.
J. N.Z. Inst. Hort., 1945, **14**: 1-9.

c HONEYWELL, E. R. 635.939.98
The zinnia (State flower of Indiana).
Circ. Ind. agric. Exp. Stat. **257**, 1940, pp. 16.

d B.Y.M. 635.939.124
***Rhododendron mucronatum* f. *sekidera* Wils. and its kin.**
Nat. hort. Mag., 1945, **24**: 224-7.

e RUSSELL, J. P. C. 635.939.124
New types of hybrid rhododendrons for the small garden.
J. roy. hort. Soc., 1945, **70**: 225-34.

CITRUS* AND SUB-TROPICALS.

1866. BAJWA, S. B. S. 634.3(545)
Commercial importance of citrus fruits in the Punjab.
Punjab Fruit J., 1945, **9**: 97-9.
With 17,150 acres under citrus the Punjab holds the third place after Madras and the Central Provinces among the citrus areas of India. In the Punjab itself the citrus industry is only second to that of mango, the main citrus growing area being the canal colonies and particularly the districts of Shahpur, Montgomery, Lyallpur and Sheikhupura. The following citrus fruits, listed in the order of their importance, are grown in the Punjab:—Malta (sweet orange), Sangtra (mandarin or loose-skinned orange), Kaghzi Nimboo (sour lime), Mitha (sweet lime), grapefruit and lemon. Assessing future prospects, the author comes to the conclusion that the citrus industry has great possibilities of expansion in the Punjab without danger of overproduction.

* See also 1644.

1867. RAM, L. A. 634.3-1.521
Varietal trials on citrus fruits [in the Punjab].
Punjab Fruit J., 1945, **9**: 101-3.
The following varieties of citrus, descriptions of which are given, are recommended by the Fruit Section of the Punjab Agricultural Department as a result of variety trials: (1) Malta Orange: Excellencis, Pineapple, Musambi, Jaffa, Valencia Late. (2) Sangtra Orange: Coorg, Nagpur, Natal tight-skinned Nartjee. (3) Grapefruit: Marsh's Seedless, Foster, Duncan. (4) Lemons and limes: European lemon, Eureka, Villa Franca. No standard varieties

can, as yet, be recommended of sour lime and sweet lime. Growers are advised to plant selected strains of these fruits showing specified characters.

1868. Bajwa, S. B. S. 634.3-1.55
Remarkable performance of some citrus orchards in the Punjab.
Punjab Fruit J., 1945, **9**: 116-7.
Returns from the citrus orchards at the Horticultural Research Sub-Stations Montgomery and Attari, the Progeny Garden, Risalewala, and from some small growers.

1869. Oppenheim, J. D. 634.3(883)
Klimatologische beschouwingen in verband met de citrusscultuur in Suriname. (**Climate and citrus in Surinam.**) [English summary, 1 p.] *Meded. Dep. landb.-econ. Zaken Surinam* **3**, 1945, pp. 33, bibl. 23.
As a result of a climatological study the conclusion is reached that Dutch Guiana is suitable for citrus growing without irrigation.

1870. Gorostiaga, A., and Guerreros, R. F. 634.3: 581.144.4: 581.192
Investigación de la riqueza en Acido Ascórbico (Vitamina C) en las hojas de diversas especies de citrus cultivadas en el departamento de Montevideo. (**Ascorbic acid (Vitamin C) content of the leaves of various species of citrus cultivated in Montevideo.**)
Reprint from *Rev. Fac. Agron. Montevideo*, No. 36, 1944, pp. 14.
In testing for the ascorbic acid (Vitamin C) content of leaves from various species of citrus, those richest in the vitamin were from lemon, lime, grapefruit and bergamot orange. The young (bud) leaves had a higher percentage of ascorbic acid than the adult leaves. The leaves most exposed to the sun (north in Uruguay) had the highest ascorbic acid content. The water extract from dried leaves of lemon and orange had a pleasant taste and aroma, and had a good ascorbic acid content.

1871. Bajwa, S. B. S., and Ali, C. N. 634.3
Cultivation and inter-cropping of citrus orchards.
Punjab Fruit J., 1945, **9**: 111-2.
It has been shown in newly planted citrus orchards of the Agricultural Department at Risalewala (Lyallpur) and Jullendur that judicious inter-cropping is profitable and beneficial to the trees. Where marketing facilities are available, the growing of vegetables is recommended, failing that leguminous fodder crops should be produced. In bearing orchards clean cultivation should be practised coupled with the growing of leguminous crops for ploughing under.

1872. Dinsa, S. H. S. 634.3-1.541.12
Bud selection in citrus fruits.
Punjab Fruit J., 1945, **9**: 112-3.
Nurserymen in the Punjab are urged to select citrus bud wood from heavy bearing branches and trees until the Punjab Provincial Co-op. Fruit Development Board is in a position to meet the demand for citrus plants by its members.

1873. Singh, S. B. 634.3-1.541.11
Propagation of citrus trees.
Punjab Fruit J., 1945, **9**: 106-9.
The propagation of Malta and Sangtra orange, grapefruit and Kaghzi Nimboo by budding and the production of rootstocks from seed is described, the latter according to the method worked out at the Citrus Stock Horticultural Research Sub-Station, Montgomery. Best germination is obtained when the seeds of rootstocks are sown in the first week of September. To avoid fungus attack, to which the young seedlings are susceptible, the seeds should be sown on raised beds, 1 ft. high, 2-3 ft. wide and about 5-6 ft. long, the ground having been well ploughed and manured. It is essential to protect the seedlings from cold; failure to do so in the winter of 1945 caused disastrous results. The seedlings should be transplanted the following October into new beds at distances of 6-9 in. within the row and 2 ft. between the rows. Special instructions are given for the transplanting of Khatti seedlings. It takes 2 years for the plant to be fit for budding. At Lyallpur seeds are extracted by a machine used for extracting juice; in the absence of such facilities hand extraction is practised. The seed must be sown immediately after extraction. Trials conducted at Lyallpur have shown that the propagation of Kaghzi Nimboo by budding or layering is much superior to propagation from seed. Malta and Sangtra buds have to be inserted without wood, thus differing from grapefruit, Kaghzi Nimboo and lemon buds.

1874. Dinsa, S. H. S., and Susahib-ud-Din, M. 634.337-1.541.5
A new method for the propagation of sweet lime (*Citrus aurantifolia* var. *swingle*) trees.
Punjab Fruit J., 1945, **9**: 114.
Up to now, propagation by cuttings has been the only method of reproducing the sweet lime, as its scion wood seemed unsuitable for budding, being very hard and thorny. In recent experiments conducted at Lyallpur these difficulties have been overcome by using immature bud wood and slightly modifying the method of budding. [Exact method not stated.] Rough lemon was used as a rootstock. Of 108 buds on rough lemon seedlings made at the end of March, 1944, and 150 on 23 April of the same year, 66·6% and 80% respectively had taken by 30 June, the mean extension growth of the leader shoots measuring 25·05 cm. and 13·01 cm. respectively.

1875. Bajwa, S. B. S., and Ram, L. A. 634.3-1.541.4
Invigorating weak citrus trees by bridge-grafting, enarching and inlaying.
Punjab Fruit J., 1945, **9**: 109-10.
All attempts to restore the vigour of decadent Bloodred Malta orange trees by cultural methods having failed, an experimental cure by (1) bridge-grafting, (2) inarching and (3) inlaying was started at the Experimental Garden, Lyallpur. The first method failed completely, but the two others achieved their object with 28 out of 42 trees treated. Both for inarching and inlaying 3 rough lemon seedlings were planted close to the affected tree. A month later the operation of inarching was performed much in the same way as in the propagation of grafted mango varieties. In the case of inlaying the seedlings were decapitated just above the point where they came in contact with the healthy portion of the bark. An inverted "T" was cut in the bark and the cut end of the seedling, which was sloping, about 1-1½ in. long, was pushed underneath the bark. With both methods the union took place in about a month's time, but the binding was not removed for 2½-3 months. The operations were equally successful whether carried out in spring or in autumn. The trees began to bear normally 2-3 years after treatment, according to how many seedlings united with the trunk. The results show the superiority of the inarching and inlaying methods of rejuvenation to grubbing and replanting.

1876. Bajwa, S. B. S., and Singh, S. B. 634.3-1.541.11
Citrus root-stock trials in the Punjab.
Punjab Fruit J., 1945, **9**: 103-6.
A progress report of the work done by the Citrus Root-stock Research Scheme, Punjab, which came into operation in 1936. The study of the influence of 7 rootstocks on growth and vigour, productivity, fruit quality, disease resistance and longevity of 4 scion varieties has given the following preliminary results: The best rootstock for the grapefruit variety Marsh Seedless and local scions of Malta orange is Kharna Khatta (*Citrus Karna*), whereas Jatti Khatti (rough lemon) and Jullunduri Khatti (smooth lemon) are best

suited to Bloodred Malta. The rootstocks Nas narain (*Citrus* sp.) and Chakotra are reported to have an improving effect on Malta and Marsh grapefruit, while Kharna Khatta proved a failure for Bloodred Malta. Rootstock influence on the fourth scion variety, Sangtra local, has not yet been fully determined.

1877. FOOTE, F. J. 634.334
Lemon orchard management investigations.
Calif. Citrogr., 1945, **30**: 232-3.

The paper deals with the decline of lemon trees in an orchard near Santa Paula, Ventura County. The trouble was found to be due to a root rot caused by a too liberal supply of water and was remedied by adopting the practice of alternating the area irrigated. This system allows a fairly thorough drying of the soil in the entire root zone at least once a year. At the same time, early season irrigations are withheld as long as possible. A change in the fertilizing programme aims at eliminating nitrite as a contributory source of decline.

1878. SOUTHWICK, R. W. 634.3-1.67
Citrus irrigation in the coastal district of Ventura County.
Calif. Citrogr., 1945, **30**: 233.

Three widely differing irrigation practices tested in the Las Posas Valley of Ventura County had little or no effect on yields, grade and size of Valencia oranges when sufficient moisture was present to support the trees and fruit. Growers are encouraged to withhold early summer irrigations of citrus on deep loam soils in good rainfall years.

1879. BENTON, R. J. 634.3-1.51
Some observations on the effects of tillage on the fertility of citrus orchard soils.
Agric. Gaz. N.S.W., 1945, **56**: 151-4.

Observations made in New South Wales support the Californian view that in citrus orchards methods of weed control other than tillage have a beneficial effect on tree condition. However, the ranging of fowls for the suppression of weeds is impracticable as long as wire netting is unobtainable and weed destruction by crude oil sprays is expensive. It is suggested that implements be devised which will cultivate the soil to a depth of not more than 1-2 in. and that trials be carried out to compare cultivation at this level with cultivation to a depth of 4-5 in.

1880. MOORE, E. C. 634.3-2.954
Non-tillage weed spray program in Tulare County.
Calif. Citrogr., 1945, **30**: 280-1.

The non-tillage weed spraying programme is being introduced on a commercial scale by a number of citrus growers in Tulare County, Calif. The assistant farm adviser's conclusions from 4 years' observations on a 5-acre test plot in a 15-year-old navel orange orchard near Lindsay and from observations of other local trials contain the following points: "The method appears to be adaptable to citrus orchards in Central California on the San Joaquin and related series of soils. Average yields in 1944-45 (field boxes per tree) were 3·85 in the uncultivated plot, 3·41 in the cultivated plot. Commercial harvest was done 3 weeks earlier in the uncultivated portion. Water penetration or soil porosity has improved, plow sole having been eliminated after the first 2 years of non-cultivation. Foliage shows less tendency to wilt in summer just prior to irrigation, indicating possibly a more efficient utilization of the moisture supply in the soil. No deleterious effects upon soil or trees have appeared as result of using oil for spraying the weeds. Applications of orchard heater oil 3 to 4 times per year have controlled annual weeds satisfactorily. Elimination of bulky organic matter applications such as winter cover crops and barnyard manure have shown no harmful effects on condition of the soil or the trees. Fertilization has been done by broadcasting soluble nitrogenous concentrates in winter. Although no accurate cost records were kept in this experiment, it is estimated that average annual cost of spraying during the entire 4-year period has been about equal to or slightly less than that of the standard program of the tillage and cover cropping."

1881. MAURI, N. 634.3-1.542
Aide-mémoire du tailleur d'agrumes. **(The citrus pruner's note book.)**
Bull. Serv. Arbor. algér. **95**, 1944 (?), pp. 45.

Approximately one-half of this brochure is devoted to an exposition of the basic principles of training and pruning citrus trees (including tree rejuvenation), their application to oranges, mandarins, Clementine oranges, lemons and grapefruits being discussed in the following pages. The third part deals with tools and such problems as the organization of a pruning gang. It is an advantage to have the trees pruned by the same worker each year.

1882. FOX, F. G. 634.3-1.542
Pruning citrus trees.
J. Dep. Agric. S. Aust., 1945, **48**: 315-7.

This paper, read by the foreman of the Berri Experiment Orchard at the October (1944) meeting of the Berri Agricultural Bureau, includes the treatment of frost-damaged citrus trees, apart from dealing with citrus pruning in general. It is a frequent occurrence, especially with lemons, that the fine fruiting wood of young trees shows better resistance to frost than the rapid growing upright shoots. If the latter are partly injured by frost, they should not be cut back but taken out entirely. In many cases the bark of the trunk of young trees is split by the frost, resulting in a strip of dead bark, mostly on the southwest side. This condition is not serious if the dead areas are covered with paint or, preferably, sump oil. The only way open to commercial growers of dealing with frost damage in mature trees is to cut out all dead wood and to thin the new growth. In the case of extensive injury to lemons, fertilizer applications should be reduced or withheld during the following year. Root pruning of frosted trees is not regarded as necessary or always advisable, but it is suggested that this is the time to use a subsoil plough, if such treatment seems desirable, as less injury will be caused by cutting large roots.

1883. SCHULTZ, E. F. 634.3-1.542-2.111
La poda de los citricos. **(Pruning citrus trees.)**
Bol. Estac. exp. agric. Tucuman, **48**, 1944, pp. 13.

This bulletin contains three short chapters, I, pruning citrus trees, except lemons, II, pruning lemon trees, and III, pruning in relation to frost. With regard to III, it is stated that citrus species in the north of Tucuman suffer from the effects of frosts more than those in the south, the reason being that in the warmer climate of the north they come into leaf earlier and so are more susceptible to injury. A sudden drop in the temperature to 2° below zero, lasting for 1 to 2 hours, causes more damage to such trees than similar temperatures would produce on trees in a more dormant condition. It is thus important to delay development by avoiding irrigation until just before the flowering period. Orange trees pruned hard are more liable to damage by frost than those left unpruned. Protection to young trees (1 to 3 years old) is afforded by wrapping the trunks and branches with straw, dry grass, or layers of newspaper. It is recommended that trunks and principal branches should be treated with milk of lime containing iron sulphate at the rate of 500 g. per 100 litres. Branches affected by frost should be cut back to healthy wood and the cut surface covered with asphaltum; the main branches when pruned give rise to a large number of young shoots which should be drastically thinned, leaving only the strongest to re-form the head.

1884. LAVRIJCHUK, V. S. 634.3-2.111
Plantation heating of citrus in Soviet subtropics.
[Russian.]
Soviet Subtropics, Nos. 11-12 (75-76), 1940, pp. 6-12.

Plantation heating as a direct method of protecting trees

from frost occupies a prominent place in citrus growing. It has been practised for a considerable time in California and the present paper is a plea for its employment in the citrus growing area of the subtropical regions of Russia. The results of first trials on citrus in the Soviet subtropics (on mandarin oranges in 1928) were less effective than those of California, but more favourable results have since been obtained, and in the winter of 1936/7 effective increases in temperature of 2° to 4·8° C. (varying with the number of heaters used) were obtained. Data of the trials are given in tabular form.

1885. LAFFOND, P. 634.3-2.1 +2.3/4
Les maladies cryptogamiques et physiologiques des aurantiacées en Algérie. **(Pathological and physiological diseases of citrus in Algeria.)**
Service de la défense des cultures, 12 Boulevard Baudin, Alger, 1939 or later, pp. 80.

An illustrated, practical introduction to all citrus diseases known to exist in Algeria. The description of the diseases (and their control) as they occur under Algerian conditions, is arranged according to the part of the tree they affect, from root to fruit: (1) *Diseases affecting the root system*: Oxygen deficiency accompanied by *Fusarium* and other rots. (2) *Diseases affecting the root collar and the base of the trunk*: (*a*) Gummosis, caused by *Phytophthora* (or *Pythiacystis*) *citrophthora* and *P. parasitica*, which were found to attack respectively citrus trunks and the young branches of Washington Navel oranges recently introduced from Spain. Preventive measures include grafting on resistant sour orange (*Citrus bigaradia*) 30-50 cm. above the soil. Surgical treatment and bridge-grafting are the curative treatments recommended for light and severe cases respectively. (*b*) Collar rot of young sour oranges caused by *Botrytis cinerea*. (3) *Diseases affecting the trunk and the limbs*: (*a*) stem rot caused by *Polyporus igniarius*, *P. fulvus*; and others. The treatment suggested is surgical. (*b*) Gummosis caused by *Diplodia natalensis* and *D. aurantii* both recently introduced pathogens. Successful surgical treatment is reported from an orchard of Valencia Late oranges in the region of Rovigo which was severely attacked by *D. natalensis*. The diseased tissue was cut out and the bark around the lesions was scraped. The wounds, often extending 50 cm.-1 m., were immediately covered with a bordeaux paste. Inspection one year later showed that the treated places were dry and that the surrounding bark was beginning to overgrow the lesions. The operation was carried out by natives under supervision and the cost did not exceed that of an ordinary insecticidal treatment. It is noted that the sour orange rootstock has proved completely resistant, but that the infection spread to some neighbouring Thomson-Navel trees. A *D. aurantii* attack on Clementine oranges at Bouinan is also recorded. (*c*) Psorosis or scaly bark. Although lesions of the scion variety were observed to extend to the sour orange in about 1% of cases, this rootstock may be regarded as practically immune. Two particular cases of psorosis, on Brazilian and Valencia Late oranges, and the incidence of the disease in Algeria, are recorded. (4) *Diseases affecting the young shoots*: (*a*) Wilting of the young branches caused by *Diplodia natalensis*; (*b*) melanose, caused by *Phomopsis citri*; (*c*) anthracnose; (*d*) bacteriosis, caused by *Phytomonas syringae*; (*e*) mal secco, caused by *Deuterophoma tracheiphila* (of little economic importance); (*f*) die-back of young sour orange shoots, caused by *Phoma iners*, like mal secco a nursery disease. (5) *Diseases affecting the foliage*: (*a*) Physiological disorders and injuries: chlorosis, variegation, gumming, "fumagine" (a dark, sooty film covering the leaves, composed of *Capnodium*, *Cladosporium*, *Alternaria*, etc., species, which develop on sugary substances deposited by certain insects on the leaves) and injuries caused by a too rapid succession of copper treatments and HCN fumigation. (*b*) Diseases caused by the following pathogens: *Phytomonas* (*Pseudomonas*) *citri*, *Sphaerella gibelliana*, *Phyllosticta fulvomaculans*, *Septoria limonum*. (6) *Diseases affecting the fruit*: (*a*) Physiological: Green spot; fruit splitting caused in September or later by rain or irrigation following a prolonged period of drought; fruit drop in May caused by water deficiency owing to excessive transpiration in a heat wave (to be prevented by winter irrigation) or by nitrogen deficiency. (*b*) Caused by the following pathogens: *Pythiacystis citrophthora*, *Penicillium italicum*, *P. digitatum*. (*c*) Superficial lesions of mechanical, chemical, pathogenic or meteorological origin.

1886. SATTAR, A. 634.3-2.1/4
Important diseases of citrus in the Punjab.
Punjab Fruit J., 1945, **9**: 121-5.

The following citrus diseases including measures for their control are described: citrus withertip, citrus canker, citrus wilt, chlorosis, *Alternaria* rot of citrus fruits, sooty mould.

1887. KLOTZ, L. J. 634.3-2.19
A progress report on citrus tree decline.
Calif. Citrogr., 1945, **30**: 242-5.

The paper reports on several lines of citrus research initiated in 1944. (1) Soil organisms. *Fusarium* species, particularly *F. solani*, and *Pythium ultimum*, were always present in the injured root systems examined, although—in contrast to two frequently isolated species of brown rot fungi—their importance in killing the roots could not be determined. (2) Drainage and nitrogen fertilization. Observations and experimental data show that injuries suffered by the roots as a result of waterlogging and lack of aeration predispose them to fungus attack. Long periods of sogginess must therefore be avoided by judicious watering. The significance of good drainage was demonstrated in another series of trials. The application of the required amount of nitrogen is recommended in the form of small doses several times during the year, possibly in the irrigation water near the end of the irrigation period, so as to keep the nitrogen in the root zone. (3) Soil treatments and tree injections. Of a number of soil treatments tested iron sulphate-sulphur and Fuller's earth were the only materials to induce stimulation of root growth. Injections of root hormones (not specified) were found to improve tree condition, while vitamin and other injections failed to produce a response. (4) Resistance to decay. The order of resistance of citrus species to the following troubles is recorded on the basis of tests: Decay of fibrous roots by brown rot fungi, gummosis, nitrite injury, slow decline.—Citrus Experiment Station, Riverside.

1888. BHAT, S. S. 634.3-2.19
The die-back disease of citrus trees.
Ind. Fmg, 1945, **6**: 250-3, bibl. 8.

Die-back of citrus, which has been prevalent in western India for a long time, is now reported from nearly all citrus-growing parts of the country. While curative remedies are those commonly used against malnutrition, the prevention lies in the selection of suitable areas for planting, which are specified. Rootstocks also play an important part in inducing vigour and hardiness under adverse conditions, and much can be done by nurserymen to improve the position by using as rootstocks only first-class material of jamburi (rough lemon). The methods of mineral deficiency diagnosis by localized leaf injections, spectrographic and chemical analysis and treatment by tree injections, as evolved at East Malling, are recommended for adoption in India. Problems relating to the irrigation, manuring and cultivation of citrus orchards are also discussed.

1889. BARTHOLOMEW, E. T., AND SINCLAIR, W. B. 634.31-2.19-2.95
Navel orange peel oil and water spot.
Calif. Citrogr., 1945, **30**: 266-7.

Previous work has shown that oil sprays increase the susceptibility of navel oranges to water spot. The present

investigation was undertaken to determine the relation of orange oil content in the peel to oil spray applications and to susceptibility. The experimental results show that oil sprays do not predispose navel oranges to water spot by changing their peel oil content. Susceptibility seems not to be influenced by the quantity of orange oil present in the peel.—Citrus Experimental Station, Riverside.

1890. WALLACE, J. M. 634.3-2.8
Technique for hastening foliage symptoms of psorosis of citrus.
Phytopathology, 1945, **35**: 535-41.
The object of the work described was the development of a standardized inoculation technique for use with the viruses of citrus psorosis. Symptoms of the disease were induced in a short time on young orange trees (basal trunk diameter 5-8 mm.) by placing small bark patches from diseased trees against the cambium beneath strips of bark peeled back for this purpose on the trees to be inoculated. Psorosis symptoms, either of a severe shock type or of the more or less typical young-leaf stippling and blotching, usually appear on the growth arising from the upper axillary buds after the trees are topped.

1891. BLACKFORD, F. W. 634.322-2.4
A *Ganoderma* root rot of citrus.
Qd J. agric. Sci., 1944, **1**: 77-81.
An unusual root rot of citrus was discovered in the Gayndah district of Queensland in 1942 on mandarin budded on rough lemon. Later, fruiting bodies appeared on the stock of an affected tree and the fungus was identified as *Ganoderma lucidum*. Further investigations showed that a root belonging to an old burnt-off *Eucalyptus* stump was the source of infection.

1892. SMITH, W. P. C. 634.31-2.48
A note on the occurrence of *Sclerotinia* twig blight of oranges.
J. Agric. W. Aust., 1945, **22**: 77-80.
The first record of *Sclerotinia sclerotiorum* in Western Australia on the woody parts of citrus species, although stem rot of orchard cover crops, caused by the fungus, is more or less common during the cold weather.

1893. CHILDS, J. F. L., AND SIEGLER, E. A. 634.31-2.952
Compounds for control of orange decays.
Science, 1945, **102**: 68, bibl. 5.
The authors have searched for compounds, which are as effective as thiourea in controlling stem-end rot (*Phomopsis citri*; *Diplodia natalensis*) and green and blue mould (*Penicillium digitatum*; *P. italicum*) of oranges but are at the same time less toxic. Of 25 materials tested the following three were found to give good to excellent control at a concentration of 5%: Thioacetamide, 8-hydroxy-quinoline sulphate and 2-aminothiazole. The oranges used in the experiment were artificially predisposed by exposure to ethylene gas to rapid stem-end decay. Treatment consisted of dipping the fruits in water solutions for 2-5 seconds. It is emphasized that toxicity investigations are required before the treatment can be recommended for general use. The active fungicidal principles common to thiourea and the compounds under trial are discussed.

1894. RAHMAN, K. A., AND ANSARI, M. A. R. 634.3-2.6/7
Insect pests of citrus plants in the Punjab and their control.
Punjab Fruit J., 1945, **9**: 118-21, bibl. 3.
The following pests are dealt with: Citrus white fly, elongate white fly, cloudy-winged white fly, Husains' black fly, black fly, citrus psylla, citrus leaf miner, lemon butterflies and scale insects and mealy bugs.

1895. HELY, P. C., AND WASON, E. J. 634.31-2.752
Control of red scale [*Aonidiella aurantii*] on citrus. Experiments on the Murrumbidgee Irrigation Area.
Agric. Gaz. N.S.W., 1945, **56**: 262-7, bibl. 2.
A number of red scale control programmes were tested on 144 Valencia trees at Leeton, Murrumbidgee Irrigation Area, New South Wales, over the period 1940-43. The experimental results show that in the case of heavy infestation fumigation cannot be dispensed with and that the best time for carrying out this operation is the second half of February. To produce really clean fruit and to obtain a residual effect in the following season a supplementary treatment with oil spray is required, the optimum timing of which proved to be about 2 weeks ahead of fumigation. Two applications at half strength with 1-2 days between were found to be more beneficial than a single application at 1: 40. While any increase in the dosage stated caused injury, oil spray applied at the correct strength was shown to stimulate foliage growth and to have a refining effect on the rind of citrus fruits, in addition to their value in scale control. Fumigation by the Calcid briquette method gave slightly better results than fumigation with the equivalent amount of liquid HCN (1 briquette=one 14 c.c. unit of liquid HCN).

1896. JENKINS, C. F. H. 634.3-2.752
The citrus red scale.
J. Agric. W. Aust., 1945, **22**: 10-8, bibl. 3.
Though widely established, the red scale, *Aonidiella aurantii*, is not so serious a pest in Western Australia as it is on the other side of the continent. The life history of the scale, the injury it causes and the control measures employed against it are described. The parasite *Aphytis chrysomphali*, which was introduced in 1905, helps in some districts to keep the population down. It is too early to assess the control value of *Comperiella bifasciata*, imported in 1943.

1897. SONTAKAY, K. R. 634.31-2.78
The bark-eating borer of orange.
Ind. Fmg, 1945, **6**: 74-5.
The noxious bark-eating borer of orange, *Indarbela quadrinotata*, is fast increasing in the Central Provinces and Berar, India. Life history of the pest and injury caused are described and pictured on a plate. The insect is controlled in the caterpillar stage by dipping a piece of cotton into such fumigants as carbon disulphide, chlorasol or even petrol, introducing it into the easily located tunnel bored by the larva and closing the mouth of the tunnel with clay.

1898. OSBURN, M. R. 632.752: 634.3
DDT to control the little fire ant (*Wasmannia auropunctata*).
J. econ. Ent., 1945, **38**: 167-8.
Good results were obtained with DDT in various forms, especially from DDT in fuel oil, against this pest which attacks citrus grove workers.

1899. PIÉDALLU, A. 632.5: 613.2
Le cactus inerme. **(Spineless prickly pear.)**
Bull. Inspect. gén. Agric. algér. **71**, 1942, pp. 4.
The value of the spineless prickly pear, *Opuntia ficus indica* var. *inermis*, as a feeding stuff and the significance of its fruits in native diet should be sufficient incentive to plant all available uncultivated land in Algeria, up to an elevation of 700-800 m., to this cactus. The nutritive value of its fruits is reported to be intermediate between that of carrots and Jerusalem artichokes, while the flowers are used pharmacologically. Propagation, planting and harvesting are described.

1900. HAYWARD, K. J. 632.961: 634.1/7-2.77
Modelo de jaula que permite la distribución de parásitos dentro de las pupas de sus huéspedes.
(A model of a cage for the distribution of parasitic insects within the pupae of their hosts.)
Rev. industr. agric. Tucuman, 1944, **34**: 23-6.
This is a detailed description with diagrams of an insect cage

used by the agricultural experiment station at Tucuman for the distribution of parasitized pupae of the fruit fly (*Anastrepha fraterculus* Wied.). The cages are suspended on the trees by rings, and the hymenopterous parasites, when they emerge from the pupae, escape from the cages, while any living fruit flies are retained.

1901. YOUNG, R. A. 633.584.5
Bamboos for American horticulture (I).
Nat. hort. Mag., 1945, **24**: 171-96.
It is the purpose of this series to illustrate and briefly describe some of the more important bamboos of different sizes and growth habits at present cultivated in the United States.

1902. HOLLAR, V. E., AND HABER, E. S. 633.492+635.61
Cultural and fertilizer studies with sweet potatoes, muskmelons and watermelons on Buckner coarse sand.
Bull. Ia agric. Exp. Stat. **P.56,** 1943, pp. 803-23, bibl. 6.
The following are the chief results obtained in *sweet potato* trials on Buckner coarse sand. (1) The 15-in. spacing in rows 3·5 feet apart gave the highest yields per acre of U.S. No. 1. (2) Five hundred lb. per acre of a 3-9-18 fertilizer were as effective as applications at higher rates. (3) In the absence of cutworm damage, 20 May was shown to be a more favourable date for planting than either 13 May or 28 May. (4) There was no difference in the value (*a*) of various sources of nitrogen, (*b*) between fertilizer applications in liquid form and as side dressing. No benefit was derived from starter solutions. (5) The response to manure, manure-commercial fertilizer combinations and fertilizers only, varied in different seasons, but it was found that satisfactory yields may be obtained by the exclusive use of commercial fertilizers. (6) The time of commercial fertilizer application did not affect yields where green manures were included in the rotation. *Muskmelons.* More early muskmelons were obtained by early planting (5 May) than by later plantings (18 May and 2 June), but total yields and the date of the last picking did not differ significantly. The application of 250 lb. per acre of a 10-6-4 or a 4-8-8 fertilizer after the runners were beginning to start from the plant produced higher yields than did the application of 8 tons of manure. *Watermelons.* No consistent results were obtained in trials comparing the effect of manure alone and manure plus fertilizer.

1903. ANON. 633.492
Cultivateurs ! Conservez la patate douce en vue de la production des plants. **(Storage of sweet potatoes in Algeria.)**
Bull. Inspect. gén. Agric. algér. **103,** 1944, pp. 4.
Growers should store a certain amount of their sweet potato harvest for propagation purposes. Careful handling, a storage temperature in the neighbourhood of 13° C., and good ventilation are essential for satisfactory slip production.

1904. COX, C. E., AND JEFFERS, W. F. 664.84.22
Pre-storage treatments for seed sweetpotatoes.
Abstract in *Phytopathology*, 1945, **35**: 483.
Immediately after digging sweet potatoes were washed in water and dipped one minute in 4-oz.-per-gallon solutions of borax, Spergon, and calcium propionate (Mycoban); the same materials in 5% colloidal silica suspension; and the silica suspension alone. None of the treatments significantly controlled storage rots. When bedded, Spergon-treated potatoes produced sprouts several days earlier than the others.

1905. JEFFERS, W. F., AND COX, C. E. 633.492-2.952
The value of several fungicides as sweetpotato seed and sprout treatment.
Abstract in *Phytopathology*, 1945, **35**: 486.
Maryland Golden sweet potatoes dipped in solutions of borax, Spergon, and compound No. 604, before bedding, produced significantly more sprouts at the first pulling than untreated and mercuric-chloride-treated. Addition of Nu-Film, a rosin-residue sticker, delayed production but significant differences were still obtained. Sprouts were dipped in various solutions at the rate of 1 lb. per material in 100 gal. Six weeks after planting, Fermate plots showed a significantly better stand than the check; both Fermate and Spergon were better than Semesan Bel. *Fusarium*-wilt infection was reduced significantly by all treatments.

1906. B[RAY], G. T. 633.85
The present position of tung oil production in the Empire.
Bull. imp. Inst. Lond., 1945, **43**: 14-8.
The tung tree growing trials started at various times since 1917 in different countries of the Empire yielded disappointing results in many cases but showed promise in others, where the industry is now being developed on a commercial scale, namely in Nyasaland, Burma, South Africa and Australia. *Nyasaland.* The area under tung trees in 1943 was about 6,850 acres, but a large expansion and the permanent establishment of the industry is planned by the Post-War Development Committee, which is investigating the growing of tung trees by the natives in the Northern Province. A Tung Experiment Station was opened at Chisawanu, Cholo, in 1940 and a factory where oil is expressed from the seeds, in 1942. *Aleurites montana* has been found to do better than *A. fordii. Burma.* It is estimated that in 1939, 10,000 acres were planted with tung trees, excluding 2,000 acres in Kengtung State, where unsuitable soil and lack of attention do not seem to warrant success. More recent information is not yet available. *South Africa.* Research work on tung cultivation is being carried out at the Sub-tropical Horticultural Research Station, Nelspruit, Transvaal. The number of tung trees planted in the Union in 1944 is estimated at 130,000 plus 100,000 in Swaziland. The crop yielded 270 tons of oil in 1943. A mill for crushing the seed has been erected. *Australia.* In 1940, there were 500-600 growers of tung with some 250,000 trees planted in New South Wales and Queensland, the two states in the Commonwealth where the most promising results have been obtained. The position in British East Africa, India and New Zealand is also discussed.

1907. MCCANN, L. P. 633.85
Embryology of the tung tree.
J. agric. Res., 1945, **71**: 215-29, bibl. 13.
Cytological details of megasporogenesis, embryo sac formation and embryo growth are given of *Aleurites fordii.*

1908. LYNCH, S. J. 634.343
The Dade white-sapote.
Pr. Bull. Fla agric. Exp. Stat. **581,** 143, pp. 4.
An illustrated description of a new white-sapote (*Casimiroa edulis*) variety raised at the Sub-Tropical Experiment Station, Florida.

1909. BLISS, D. E. 634.62-2.4
Omphalia root rot of the date palm.
Hilgardia, 1944, **16**: 15-116, bibl. 52.
Omphalia root rot has affected about 1% of the total acreage under date palms in the Coachella Valley of California. Two types of symptom are recognized: (1) primary symptoms, necrotic lesions usually confined to the underground portion of the palm and its developing offshoots, and (2) secondary symptoms, the indirect effects of the disease, including the premature wilting and death of the older leaves, the retardation of terminal growth, the reduction in size and number of fruit stalks, and the development of small, worthless fruit. The occurrence of the disease may be prevented by using healthy offshoots in non-infested soil. Certain varieties and many seedlings show considerable

tolerance to the disease. Under field conditions carbon disulphide was considered to be the most satisfactory of the soil disinfectants tried.

1910. WOLFE, H. S., AND LYNCH, S. J. 634.651(759)
Papaya culture in Florida.
Bull. Fla agric. Ext. Serv. **113,** 1942, reprinted 1944, pp. 35, bibl. 21.
There has been a large fluctuation in papaya production, one of the minor fruit industries in southern Florida, but a more stable development is expected in future. A full description is given of how to grow and handle the fruit in Florida.

1911. CHOWDHURY, S. 634.651-2.4
A leaf spot of *Carica papaya* L. caused by a new species of *Phyllosticta*.
Ind. J. agric. Sci., 1944, **14**: 395-8.
A very serious leaf spot of *Carica papaya*, not previously observed in Assam, has caused great damage at Haflong and in the North Cachar Hills. The causal fungus was found to be a new species of *Phyllosticta* which was named *P. sulata*. The symptoms of the disease are pictured in a colour plate. Control measures recommended consist of the destruction of affected leaves and spraying with 1% bordeaux.—Plant Pathological Laboratory, Sylhet, Assam.

1912. SALA ROQUETA, R. 634.653
El aguacate en nuestra costa mediterránea. **(The avocado on the Spanish Mediterranean coast.)**
Anal. Esc. Agric., Barcelona, 1942, **2**: 349-78.
The author gives reasons for considering the avocado, *Persea gratissima* Gaertn., as suitable for cultivation in the Mediterranean regions. He describes the fruit, its use and nutritive value, the origin of the avocado and its present geographical distribution, the morphology and pollination of the flowers. He discusses the climate and soil conditions suitable for the avocado, stressing its need for abundant moisture, but good drainage is essential to ensure that there is no stagnant water at the roots. The trees may be raised from seed but, in order to preserve the purity of any variety, budding must be resorted to. The chief characters are given of three varieties, Cabré, Camprubi, and Maluquer, grown in north-east Spain.

1913. SIERRA, H. M. 634.653
Perspectiva futura del aguacate. **(The future of avocado cultivation.)**
Rev. agric. Guatemala, 1944, **1**: 56-7.
It is claimed that the Guatemala varieties of avocado are the best in the world, and moreover that that country produces the largest avocado, known as Coco and weighing 3 or 4 lb., and also Mutoloj, the smallest, which is about the size of a plum. The author makes a plea for increased cultivation of the avocado in Guatemala, maintaining that it has good prospects there.

1914.

a BAKER, E. W. 632.77: 634.1/7
Studies on the Mexican fruitfly known as *Anastrepha fraterculus*.
J. econ. Ent., 1945, **38**: 95-100, bibl. 5.

b BLISS, D. E., AND FAWCETT, H. S. 632.48: 634.3
The morphology and taxonomy of *Alternaria citri*.
From reprint *Mycologia*, 1944, **36**: 469-502, bibl. 41.

c BUMGARDNER, R. J. 632.752: 632.96
***Cybocephalus* established in California.**
J. econ. Ent., 1945, **38**: 128, bibl. 1.
A predator on citrus scales.

d COPELAND, O. C., AND SHEPARDSON, C. N. 634.3-1.57
Dried citrus peel and pulp as a feed for lactating cows.
Bull. Tex. agric. Exp. Stat. **658,** 1944, pp. 17, bibl. 6.

e KELLY, J. T. 634.3-1.576
Citrus by-products as stock food.
J. Dep. Agric. Vict., 1945, **43**: 209-10, bibl. 4.

f RUEHLE, G. D. 634.653-2.42
The cause and control of avocado scab.
Pr. Bull. Fla agric. Exp. Stat. **580,** 1943, pp. 4.

g WEST, E. 634.651-2.4
Papaya leaf spot [caused by *Asperiosporium caricae*].
Pr. Bull. Fla agric. Exp. Stat. **584,** 1943, pp. 2.

TROPICAL CROPS.

1915. GREENWAY, P. J. 633/635(676)
Origins of some East African food plants.
E. Afr. agric. J., 1944, **10**: 34-9, 115-9; 1945, **10**: 177-80, 251-6; **11**: 56-63, bibl. 77.
An interesting account of the origin of the more important East African food plants and their history in East Africa, exclusive of the more temperate vegetables and fruits consumed by Europeans. The various species are arranged under the following headings in alphabetical order according to their common names: Roots and tubers; leaves; fruits; fruits used as vegetables; pulses; beans, grains and peas, etc.; grains; oil seeds; spices and condiments; beverage plants. The paper concludes with a list of plants according to continent of origin. The bibliography is subdivided in groups, to correspond with the headings under which the plants are treated.

1916. BARROSO, L. J. 586.1(81)
Chaves para a determinação dos gêneros indigenos e exóticos das Dicotiledôneas do Brasil. **(Keys for the determination of indigenous and introduced genera of dicotyledonous plants in Brazil.)**
Minist. Agric., Serv. Flor. Rio de Janeiro, Vol. 2, 1944, from review *Ceres*, **6**: 131.
This volume treats exclusively the family Leguminosae, presenting primarily a key for the determination of subfamilies; it consists of 53 pages and 9 plates. It includes 22 genera of Mimosoideae, 61 of Caesalpinoideae, and 121 of Papilionatae. The third volume is in preparation.

1917. ANON. 633.3
Leguminosas. **(Leguminous plants.)**
Rev. agric. Guatemala, 1945, **1**: 296-303.
This is a general account of the family and its sub-families, and of the root-nodules and their function in relation to the host plants and soil fertility. Among plants useful for green manuring are mentioned species of *Canavalia* and *Crotalaria*, and the cowpea and lupins.

1918. MANRIQUE, A. A. 631.874
Kudzu. **(The kudzu vine.)**
Rev. agric. Guatemala, 1945, **1**: 438-46.
This is an article taken from the Revista de Agricultura y Comercio de Panamá. It describes the kudzu vine, *Pueraria thunbergiana*. A native of Japan, when introduced into America it was at first grown extensively as an ornamental plant, but later it was found to be excellent for preventing soil erosion; it serves also as a forage plant.

1919. HOPKINS, E. F., PAGÁN, V., AND SILVA, F. J. R. 631.811.9: 546.72+546.711
Iron and manganese in relation to plant growth and its importance in Puerto Rico.
J. Agric. Univ. Puerto Rico, 1944, **28**: 43-101, bibl. 37.
While much work has been done on minor element

deficiencies, comparatively little is known of the toxicity of trace elements in higher concentrations. The present investigation shows that manganese toxicity chlorosis is prevalent in Puerto Rico pineapple cultures on acid soils, which were found to contain 130 p.p.m. of water-soluble manganese in the absence of water-soluble iron. A contributory factor in producing this condition has been the lowering of soil acidity to pH 4·0 or less owing to the continued use of ammonium sulphate. So far, chlorosis of pineapples on acid soils has been commonly combated by applications of iron sulphate sprays. As a result of an extensive study the following more satisfactory method of control is tentatively recommended: (1) Immobilize soluble manganese by means of finely ground limestone so as to adjust the soil reaction to pH 6·0. (2) Apply at least part of the nitrogen in the form of nitrate. (3) Increase iron availability by raising the organic matter content of the soil. (4) Continue iron sulphate sprays until the soil condition has been corrected. Beans were used very successfully as indicator plants of manganese toxicity, symptoms of chlorosis already appearing in different degrees of severity at the opening of the first trifoliate leaves. A better understanding of the interaction of iron and manganese in the plant was gained by means of water and subirrigation gravel cultures of beans, tomatoes and pineapples. The results are shown in tables, diagrams and 3-dimensional figures, while the conclusions drawn are formulated as follows: "Chlorosis, necrosis, sunscald and decreased growth of the plants were strikingly associated with low iron and high manganese, while such things as increased size and weight of the plants, earliness of appearance of trifoliate leaves, tendrils, flowers, and fruits, and the rate of recovery from chlorosis were markedly associated with low manganese and high iron. The ratios of dry weights of tops to roots indicate that the tops were affected more by variation in the iron-manganese relationship than the roots. In general the Fe/Mn ratio was found to be the controlling factor in growth, but for each given ratio growth varied with the total concentration of iron plus manganese. An interesting effect of manganese on phototropic movements of seed leaves of bean plants was studied. At 20 p.p.m. manganese, 2 p.p.m. iron were sufficient to prevent these movements. This and other phenomena in respect to light have led to the idea that iron acts as a protective agent against light and also that the interaction of the three factors: iron, manganese, and light, are important determinants controlling the oxidation potential of green plants. In proper balance a normal range of the oxidation potential results. When not in proper balance a too high or too low a range of potential for plant tissues occurs and toxicity appears."

1920. IPPISCH, F. 631.874: 551.566.1
La importancia del abono verde. **(The importance of green manuring.)**
Rev. agric. Guatemala, 1945, **1**: 104-6, 231-3.
The author makes a plea for adopting green manuring in Guatemalan soils that have become impoverished by the removal of forests followed by the sowing of cereals. A list of plants that experimentally have given favourable results is included.

1921. DAVIES, E. B. 631.821
Las necesidades de los suelos en cal. **(The lime requirements of soils.)**
Rev. agric. Guatemala, 1945, **1**: 283-8.
The author discusses soil reaction and mentions methods of estimating the pH and lime requirements of soils. The optimum pH for each of a number of field and garden crops is given.

1922. CAMPOS, A. R., AND PICKEL, D. B. J. 632.3/4
Observações sôbre as doenças e agentes patogênicos das plantas em Pernambuco. **(Observations on diseases and pathogenic agents of plants in Pernambuco.)**
Rev. agric. São Paulo, 1945, **20**: 19-38, bibl. 32.
This article consists of notes on the diseases of a number of cultivated tropical and sub-tropical plants listed under (1) field crops, (2) fruit plants, (3) garden crops, (4) ornamental plants, (5) forest trees.

1923. HAMBLETON, E. J. 632.796
Sugerencia para controlar las hormigas que cortan les hoyas. **(Suggestions for the control of leaf-cutting ants.)**
Rev. agric. Guatemala, 1945, **1**: 142-9.
The information in this article comes from the Office of Foreign Relations for Agriculture of U.S.A. in collaboration with the Administration General for Agriculture in Guatemala. Ants which bite off the leaves of agricultural and horticultural crops are a constant menace in the tropics. From Texas to Louisiana in U.S.A., about a dozen species and a number of sub-species extend through Mexico, Central and Southern America to Argentine. They attack many species of cultivated plants using the leaves, fruit and flowers as a medium on which they cultivate a fungus that serves as their food. Various types of ants' nests are described in relation to methods of control. These measures are discussed under I, poisonous gases (carbon disulphide, sulphur, arsenic), and their application, II, inundation, a laborious method, which, unless very thorough, does not yield satisfactory results, III, destruction of the nests by hand: this is a very laborious and disagreeable task not to be recommended when chemical methods are available; it may be used for small new nests, but for large ones it involves the removal of tons of soil and the consequent disturbance of the soil.

1924. HAMBLETON, E. J. 632.752
Experiments with DDT on leaf-cutting ants [*Atta cephalotes*] in Ecuador.
J. econ. Ent., 1945, **38**: 282.
Results of applying DDT to ant nests were unsatisfactory.

1925. MAJOR, F. 632.951: 615.779.1
Pyrethrum flowers from Nigeria.
Bull. imp. Inst. Lond., 1944, **43**: 7-8.
Data are presented which show that pyrethrum flowers from Nigeria contain a satisfactory amount of total pyrethrins.

1926. HOLMAN, H. J. 632.951: 615.779.1
Pyrethrum: a Kenya contribution to health.
Crown Colon., 1945, **15**: 237-9, 242-4.
A beautifully illustrated description of the pyrethum industry in Kenya, which was started in 1933 and had gained world importance by 1939, the minimum pyrethrum content of the Kenya product being 1·3% as against 0·9% of the Japanese flowers. It is estimated that the 1944 crop amounted to 6,500-7,000 tons harvested from 45,000-50,000 acres. It is not thought that the profitable industry will be adversely affected by the new insecticide D.D.T. for some time to come.

1927. CHOPRA, I. C., AND OTHERS. 632.951: 615.779.1
Pyrethrum in Kashmir.
Curr. Sci., 1945, **14**: 104-5.
The data presented show that (1) pyrethrum can be profitably grown in Kashmir at altitudes of 5,000-8,000 ft., the optimum being 6,000 ft.; (2) the pyrethrin content increases in the flower from the closed to the open stage; (3) sun-dried flower heads have a higher pyrethrin content than those dried in the shade, while flower heads dried partly in the sun for 3 days and subsequently in the shade contain the highest percentage of active principles; (4) the active principle content decreases with the age of the plantation. Manuring experiments with the aim of counteracting the effect of soil exhaustion are in progress.—Drug Research Laboratory, Jammu Tawi, Kashmir.

1928. CASTAGNE, E. 632.951: 615.779.1
Teneur en pyréthrines des pyrèthres congolais. **(Pyrethrin content of pyrethrum from the Belgian Congo.)**
Bull. agric. Congo belge, 1940, **31**: 97-115.
The author is chiefly concerned with the difficulties which at

present attend any estimate of the exact pyrethrin content of pyrethrum from the Congo. It is known to be comparable, when produced at sufficiently high altitudes, with that from Kenya, but at present all estimates are made, not in the Congo, but after a long journey to Belgium. There the analyst receives inadequate information as to source, method of extraction and even what lines his report is to follow. In short, it seems essential that a laboratory for testing pyrethrin content should be available in the Congo and that a decision should be reached as to what information is wanted not only as to pyrethrin content but also, previously, as to cultivation, harvesting and curing methods. Several different methods of analysis are discussed in the paper.

1929. STOFFELS, E. H. J. 632.951: 615.779.1
La culture du pyrèthre au Kivu. **(The cultivation of pyrethrum at Kivu.)**
Bull. agric. Congo belge, 1940, **31**: 82-96.

Trials at Kivu indicate that the Belgian Congo affords just as good opportunity for the growth of pyrethrum as Kenya. The present article discusses work in Kenya and at the several plantations near Kivu where successful plantings have been made. The pyrethrin content is higher than that of the Japanese-produced pyrethrums.

1930. DEWEY, L. H. 633.526.1
El abaca. **(Manila hemp.)**
Rev. agric. Guatemala, 1945, **1**: 194-7.

The general appearance of the plant is described and its distribution as a cultivated crop is reviewed. It is a perennial plant propagated by suckers which arise from short rhizomes, and the crop is ready for cutting in the second year after planting the suckers. The preparation of the fibres from the plants is described.

1931. ANON. 633.683
Harina de yuca. **(Cassava meal.)**
Rev. agric. Guatemala, 1944, **1**: 68-73.

There are two species of manioc or cassava, *Manihot utilissima*, the bitter, and *M. palmata*, the sweet cassava, but they comprise more than 90 cultivated varieties which can be distinguished by the colour of the foliage (green to reddish or purplish), by the number of lobes of the leaves, and, particularly, by the shape and colour (yellow or white) of the tubers. The present distribution of the cassava is briefly reviewed. The plant succeeds best in tropical maritime regions. The following features are discussed: (1) the preparation of the soil, (2) propagation, generally by cuttings, a method rapid and practical which is described, (3) intercropping, (4) cultural care, (5) time and method of harvesting the tubers, (6) its uses, (7) the chemical composition of the tubers, (8) the preparation of cassava meal from the tubers.

1932. EDEN, T., AND BOND, T. E. T. 633.72-2.5-1.8
The effects of manurial treatment on the growth of weeds in tea.
Emp. J. exp. Agric., 1945, **13**: 141-57, bibl. 18.

Of late years tea growers in Ceylon have complained about the prevalence of weeds and have expressed the view that changes in the type of manure, particularly the extensive use of ground nut cake in place of sulphate of ammonia, were responsible. The investigation was undertaken to check these views. It was found that the source of nitrogen had no effect on weed yield after 3½ months' unrestricted growth, the element being relatively of much greater importance for tea than it is for weeds. Phosphorus, on the other hand, applied at the 30 lb. per acre level, increased weed growth markedly. An increase in the dosage from 30 to 60 lb. gave no significant weed yield response, but raised the P_2O_5 content of weeds considerably. The only other significant responses obtained were a reduction of N-content as a result of phosphatic manuring and an increase in K-content produced by potash manuring. The conclusion is reached that phosphorus applications above the 30 lb. per acre level are wasteful in view of the heavy withdrawal by weeds. The system of weeding in force for several years has left *Polygonum nepalense*, a desirable ground cover, predominant, this species contributing about 9·1% of the cover. The "skewer" test, a modified "point quadrat" method of estimating percentage cover of the vegetation, is described, and responses of certain weed species to manuring are recorded. In the appendix a list of plant species recorded by the half-metre quadrats is presented.—Tea Research Institute of Ceylon.

1933. EVANS, M. C. 633.72-1.536
Replanting tea.
Tea Quart., 1944, **17**: 25-8.

The author undertook an experiment on his estate to determine whether eradication of old tea and replanting is profitable as compared with supplying. Careful records of costs and yields for 4 years are presented. Although it is too early to reach definite conclusions, the figures seem to suggest that on the whole the method of replanting was a success and that the number of economic yielders has been increased. Partial failure, however, underlines the necessity of investigating the reason for the uneconomic state of the tea previous to replanting. If the soil is at fault, the restoration of soil fertility should be the preferable practice.

1934. CHARNAUD, F. C. 633.72+633.15
Notes on growing Indian corn interplanted in old tea after pruning.
Tea Quart., 1944, **17**: 22-5.

A grower advocates and describes the cultivation of Indian corn intercropped with tea. Provided the Indian corn is not planted sooner than 2-4 months after tea pruning (according to elevation) and is properly cared for, tea yields are reported to be beneficially affected.

1935. GADD, C. H. 633.72-2.76
Shot-hole borer damage and tea yields.
Tea Quart., 1944, **17**: 2-11, bibl. 6.

The continuation of the experiment reported in *Tea Quart.*, 1943, 16: 3-9; *H.A.*, 14: 1890 strongly confirmed the existence of a correlation between yields and shot-hole borer damage in tea. Maximum damage occurred in June and July of the second year from pruning and decreased rapidly till February of the third year, remaining at an almost stable value till September. Although the general level of shot-hole borer attack had fallen considerably in the third year, those plots which had the larger yields had also the greater number of broken branches (measure of damage). A graph illustrating the relation during the third year from pruning shows an increase by 62 breaks for every increase of 10 lb. in yield. From the data presented it is evident that the amount of shot-hole borer damage depends chiefly on the age of the bush from pruning and to a relatively small degree on the fertility of the field. Apparently, the vigorous condition of the bush prevailing in the second year is conducive to the growth of the ambrosia fungus (planted by the female in the gallery) on which the young brood feed. Restricted fungus growth will reduce the size of the beetle brood and the number of new galleries. The prolongation of the pruning cycle resulted in an increase in yield during the third year (11 months) by 60 lb. per acre as compared with the average for the first two years. Hence, the prolongation of the plucking cycle beyond two years may be beneficial in shot-hole borer infested areas.—Tea Research Institute, Ceylon.

1936. GILBERT, S. M. 633.73(67.82)
The Coffee Research and Experiment Station, Tanganyika Territory: a brief survey of the first ten years' work.
Emp. J. exp. Agric., 1945, **13**: 113-24.

The 10-year period reviewed, 1934-43, must be divided into three divisions: 1934-36, preparatory, viz. clearing the land, equipping the laboratories and touring the coffee-growing

areas of East Africa to appreciate the main problems; 1937-39, the period of maximum development, with a full programme of investigations in train; 1940-43, greatly reduced activities owing to the transfer of scientists to the services. The work is discussed under two heads: (1) *Improvement of the coffee bush*, entailing the selection of trees possessing all desirable commercial properties combined and their propagation. Until the outbreak of war 100 such trees were selected for further study out of some 20,000 examined. In 1937-8 about 12 acres of seedling progeny of potential selections were planted out in the field, and about 8 acres of clonal progeny of the same selections were planted in 1943-4. A further 5 acres will be planted when the cuttings are rooted. (2) *Improvements in environment*. The experiments in progress cover the main problems of nitrogen requirements, with and without shade, and of mulch, compost, irrigation and the relations between them. The results are tabulated. A brief description is given of the standard measure applied against erosion immediately after clearing the land.

1937. DE MELLO, A. T. 633.73-1.536
Os torrões das mudas. **(Balling the roots of transplanted coffee seedlings.)**
Rev. Dep. nac. Café (*D.N.C.*), *Rio de J.*, 1945, **24**: 655-8.

The author raises the question whether seedling coffee plants should be transplanted with or without soil round their roots. In the present paper he describes the method of raising seedlings, and transplanting them with the balled roots. The seeds are sown, with the rounded end upwards, in trenches 6 cm. deep, covered with fine soil to a depth of 1 cm. and then watered. When the resulting seedlings have 6 to 8 leaves they are transplanted to 15 cm. apart in rows 20 cm. apart. They should be moved from the seed-bed to the nursery rows in a hand-cart rather than a wheelbarrow so as to avoid shaking the soil from the roots. The transplanting should be carried out preferably during a wet period. Care should be taken to retain as much soil as possible round the roots when planting out. The soil should be well pressed down round the young plants and the surface levelled but it may be raised a little for 3 cm. around the collar.

1938. LEWINSOHN, R. 633.73
A experiência da valorização. **(Coffee economics.)**
Rev. Dep. nac. Café (*D.N.C.*) *Rio de J.*, 1945, **24**: 477-81.

An abstract from the author's book " Tristes e cartéis—Suas origens e influências na economia mundial " (Trusts and cartels, their origins and influence on the world's economy), which includes a history and an analysis of the politics and organization of the coffee trade up to the present time, with particular reference to its development under the regime of the Washington Convention.

1939. RAYNER, R. W. 633.73-2.112
Leaf scorch.
Mon. Bull. Coff. Bd Kenya, 1945, **10**: 48-9.

Drought conditions in Kenya during the last 2 years have been associated with different forms of leaf scorch of coffee, some of them new or little known. The article describes the symptoms of a number of leaf scorch types and discusses their possible causes. A key has been worked out which should prove useful in determining the nature of any scorch met with in the field.

1940. TAUNAY, A. DE E. 633.73-2.421.1
A propósito do mal de Cantagalo. **(The Cantagalo disease.)**
Rev. Dep. nac. Café (*D.N.C.*) *Rio de J.*, 1945, **24**: 469-76.
Combate ao mal de Cantagalo. **(Combating the Cantagalo disease.)**
ibid., **24**: 631-9.

These two articles are a historical survey of observations on Cantagalo disease of coffee trees in Brazil and are concerned chiefly with an account of the disease, written in 1877, by a Dr. Baglioni, who attributed it to a species of *Erysiphe*. The second article deals with Dr. Baglioni's recommendations for control, which, however, are considered quite impracticable under Brazilian conditions.

1941. MELVILLE, A. R. 633.73-2.6/7
Annual report of the Entomologist (Coffee Services)—1944.
Mon. Bull. Coff. Bd Kenya, 1945, **10**: 58.

Studies on the coffee thrips (*Diarthrothrips coffeae*) have been the main preoccupation of the Entomologist in 1944, the pest having caused considerable devastation in the coffee plantations of Kenya during the past succession of dry years. The report records the development of the work on a cheap, easily applicable, harmless spray with a long residual effect and notes different phases of the successful paris green formula. Latest results suggest the following modifications of the spray formula and of the method of application previously recommended (*ibid.*, 1944, 9: 123-5; *H.A.*, 15: 883 and 1945, 10: 20; *H.A.*, 15: 1254). (1) The amount of hydrated lime added should be raised to 3 lb. per 40 gal. (2) Spraying should be started whenever thrips become noticeably visible at any point in the plantation.

1942. TAYLOR, T. H. C. 632.754: 633.73
Recent investigations of *Antestia* species in Uganda.
E. Afr. agric. J., 1945, **10**: 223-33 and **11**: 47-55, bibl. 8.

For earlier accounts of *Antestia* in Uganda see H. Hargreaves, *Agriculture in Uganda*, 1940, and T. H. C. Taylor, *A.R. Dep. Agric. Uganda for 1938-39*, 1940. The present report deals only with those aspects of the problem upon which recent work throws new light. Complete control of the pest could be achieved with chemicals if their regular application were generally enforced. As this seems impracticable at present with Africans, one has to be content with partial control by biological means. The measures suggested for the encouragement of existing parasites and the introduction of new species are summarized as follows:—(1) Maintenance of open growth by regular pruning of the coffee trees. (2) Maintenance of almost continuous ground cover, preferably by alternate inter-row weeding. (3) The introduction of *Corioxenos* and of *Epineura* in suitable localities. Recommendation (3) should not be carried out indefinitely; it should be governed by the results of existing experiments and of the additional experiments proposed for *Epineura*.

1943. RIPPER, W. E. 633.74-2.6/7
Possibilities of chemical control of cacao pests. A report on a journey to the Gold Coast, November, 1944.
Private publication, mimeographed, 1945, pp. 20.

The author was asked to visit the cacao farms of the Gold Coast in order to give an opinion on the possibilities of controlling cacao pests by spraying. The answer is a qualified " yes ", viz. chemical protection of the crop can be achieved where the lay-out of the plantation allows the use of modern equipment. Whether the increase in yield would justify the expense of chemical control can only be shown by field experiments on a big scale, the initiation of which is strongly advocated. With suitable facilities provided it should not take longer than 2½ years to work out correct spraying methods. The adoption of chemical methods, if found profitable, would tide the industry over until biological control measures could be put into operation. The evacuation of the industry to other parts of the world would, in the author's view, be no solution of the problem, since the pests must be expected to follow the crop in due course.

1944. MEDINA, E. H. 633.821
The value of utilizing existing shade in the growing of vanilla.
J. Agric. Univ. Puerto Rico, 1943, **27**: 117-24.

Eight-node vanilla cuttings of uniform size and vigour were planted on an experimental plot, half of which had been cleared from all trees and underbrush 2 years before; both portions had been planted with support stakes of dwarf bucare at the same time. After 10 months root formation of the vines planted under existing shade was found to be over three times as great as that of vines growing on cleared land, and the rotting of newly formed roots was considerably delayed. Further marked differences are noted in the appearance and colour of the vines on the two plots, those planted under existing shade being healthier in every respect. The results show that vanilla vines will thrive best on land with only a minimum amount of clearing, which practice, in addition to saving labour, eliminates a delay of 1-2 years. Observations demonstrate that even the planting of supports is superfluous, since existing shade trees can be used for the purpose with equal success.

1945 NARODNY, L. H. 633.821(729.72)
Vanilla cultivation in Dominica.
Roseau, Dominica, B.W.I., 1945, pp. 23.

This pamphlet is written as a brief guide to those intending to establish vanilla as an estate crop on a large scale. Only a few of the points raised in 7 chapters can be mentioned in this context. (1) *Plants*. The time necessary to produce a crop of beans depends largely on the size of the cuttings used to establish the plantation. While a cutting of 2 nodes may take 5 years to come into bearing, the author has obtained a crop in one year from a cutting of 24 nodes. As the supply of plants is limited, the problem arises before every planting how a given number of plants is to be utilized. The author's advice is that it is better to bring a smaller number of plants into bearing soon than a larger number later, particularly in view of the unstable vanilla prices on the world market. January is generally agreed to be the best month for planting in Dominica, but cuttings, which have been exposed to ethylene (concentration 1: 10,000) will show roots and new tips within 2-3 days and may be planted at any time of the year. The optimum time of exposure to the gas has still to be determined. (2) *Supports*. The practice of using cocoa trees, coconut palms, etc., as supports is deprecated. To avoid injury to the very delicate root nothing but vanilla should be grown on a vanilla plantation. The best quick-growing supports are *Gliricidia*, immortelle, hibiscus and croton, the planting distance recommended for *Gliricidia* being 9×9 feet. It is generally overlooked, but nevertheless of primary importance, that a gentle circulation of air in the plantation should be encouraged. (3) *Manure*, etc., *tillage*. In one small-scale experiment it was shown that vanilla plants benefited from Florida phosphate applied directly to the roots. The practice of burning the soil in isolated boucans cannot be dispensed with, but measures to reduce erosion are necessary. Animal manure and lime are beneficial. The roots should be protected by a heavy bed of sugar cane or vetivert mulch, especially in heavy clay soils, where the roots may never get below the surface. A steep slope is very helpful for the drainage of the root system. The best method of tillage is to ensure air circulation in the soil by putting a strong fork vertically in the soil and moving it to and fro. (4) *Shade*. The shape of the vanilla leaf is a reliable indicator of any deviation from the optimum light condition, which is one-half shade. Average healthy leaves are 3 times as long as they are wide (7½ by 2½ in.). A leaf growing under too much shade is 4 (or more) times as long as it is wide. Lack of air is shown by a very small leaf, while scars on leaves and stem are indicative of too much wind. Excess of light is shown by a yellow leaf and by a short wide bean. Colour and shape of the leaf may also serve as an indicator of fertilizer requirements. The ideal condition of shade is perhaps obtained by the use, as support, of certain hibiscus varieties, which seldom want trimming after they have been once pruned at the base. The breeding of special hibiscus varieties is desirable. Growing Capi or Volcan vines on the stake provides early shade and allows the vanilla to be planted almost simultaneously with the support. (5) *Pollination*. One-half of the flowers only should be fertilized in order to obtain highest yields in weight and, even more important, not to weaken the disease resistance of the plant. A simple method of branding is described and curing and drying are briefly discussed. (6) *Marketing*. A discussion of the world market situation shows that prospects for Dominican vanilla are good. (7) *Diseases*. Liming and sterilization of the soil by burning are the measures recommended for root rot control. The method of applying lime by leaf injection, as developed at East Malling, is under trial.

1946. ARANA, F. E., AND KEVORKIAN, A. G. 633.821
Relation of moisture content to quality of vanilla beans.
J. Agric. Univ. Puerto Rico, 1943, **27**: 105-16, bibl. 7.

The moisture content of uncured vanilla beans was found to decrease with maturity. The average value obtained for whole beans entirely green was 81·2% and for whole, blossom-end yellow, 79·2%. A nomograph is included showing the weights to which 100-lb. lots of beans of different moisture contents should be reduced during curing to obtain a known moisture content in the end-product. Moisture content was found to affect the appearance and aroma of the beans but did not produce any effect in the phenol value. Puerto Rican vanilla beans should be cured to a final moisture content of 30% to 35%, if good flexibility and development and suavity of aroma, the principal factors affecting the sales value, are to be obtained. Beans with similar moisture content, subjected to hot-water or freezing treatments, were found to be less liable to mould infection than sun or ethylene-treated beans. [From authors' summary.]

1947. LYNCH, S. J., AND WILMOT, R. J. 633.825
Ginger growing in Florida.
Pr. Bull. Fla agric. Exp. Stat. **601**, 1944, pp. 3.

A selected strain of Jamaica ginger, *Zingiber officinale*, from Puerto Rico was grown experimentally at the subtropical Experiment Station at Homestead, Florida, and other places. There was a heavy production of good rhizomes, so that an increase of 30 to 1 in a single season may be expected under favourable conditions. Pieces of the rhizome 1-1½ in. long, containing at least 1 eye, should be planted 1 in. deep, at least 15×15 in., in a well prepared bed in partial to complete shade. The soil should be of the texture of heavy loam, generously supplied with nutrients and moisture. The application of ¼ lb. per plant of a 4-7-5 fertilizer on 1 June, 15 July and 1 September is recommended. Thorough watering, at least 3 times a week during dry periods, is necessary. The rhizomes are harvested in autumn and stored during the winter in dry sand, or they may be left in the ground and dug in spring for propagation purposes. So far no diseases or pests have been observed.

1948. IPPISCH, F. 633.833
Cultivo de la canela. **(Cultivation of cinnamon.)**
Rev. agric. Guatemala, 1944, **1**: 8-10.

This article recommends increased cultivation of cinnamon (*Cinnamomum zeylanicum* Breyne) in Guatemala. It includes a brief description of the plant and of its introduction into Guatemala, its cultivation and treatment, the removal and preparation of the bark, the grades of quality of the product and its use and value as a condiment.

1949. BRAY, G. T., AND MAJOR, F. 633.841
Black pepper from Sierra Leone.
Bull. imp. Inst. Lond., 1945, **43**: 6-7.

Trials have shown that black pepper can be grown successfully in various parts of Sierra Leone. Data on its chemical composition are recorded.

1950. CHOWDHURY, S. 633.841-2.4
***Rhizoctonia* root-rot of pan (*Piper betle*) in relation to manuring.**
Ind. J. agric. Sci., 1944, **14**: 391-4.
The percentage of death of pan plants caused by *Rhizoctonia solani* was found to be uninfluenced by the nature of the fertilizing material.—Plant Pathological Laboratory, Sylhet, Assam.

1951. BAILLAUD, E. 633.85
L'augmentation de la production des oléagineux dans d'Empire français. **(The increase of oil production* in the French Empire.)**
Bull. Mat. grass., 1942, **26**: 27-52, 53-106, 107-42, 145-74, 175-86, 193-229, 230-4.
These reviews give fairly full accounts of the past history and future hopes for the commercial production of the oils of the following crops in French Africa:—ground nut, palm oil (sections 2, 3 and 5), castor bean (section 4), coconut and butter tree (*Butyrospermum parkii*). The economics of their cultivation, extraction and transport are considered.

1952. PAUL, W. R. C., AND FERNANDO, M. 633.861.3
Cultural experiments with turmeric (*Curcuma domestica* Val.). III. The influence of type of seed, mulching, planting depth and shade on yield.)†
Trop. Agriculturist, 1944, **100**: 9-13, bibl. 3.
The shade applied in the experiment was similar in degree to that prevailing under natural conditions when turmeric is grown together with other crops; it was found to have a markedly depressing effect on yields of rhizomes. Further trial results indicate that plants derived from "fingers" gave higher yields than those derived from mother sets and that shallow planting is not inferior to deep planting. Owing to a heavy initial mulch of rice straw no response was obtained to a second application.—Experiment Station, Nugawela.

1953. SHIMOYA, C. 633.88
Observações citológicas em chaulmoogra.
(Cytological observations on chaulmoogra.)
Ceres, 1944, **6**: 76-81.
This is a cytological study of the sexual organs of chaulmoogra, *Taraktogenus kurzii* King, to determine the relation between the hermaphrodite and the staminate flowers. It was found that the staminate flowers produced a large number of pollen grains, but no mature pollen grains were found in the hermaphrodite flowers. These results were in conformity with observations in the plantation where the hermaphrodite plants bearing most fruit were those in closest proximity to staminate plants. The hermaphrodite flowers thus appear to function as unisexual female flowers, and a plantation with hermaphrodite plants only is a disadvantage.

1954. CLAUSEN, R. T. 587.36: 633.88
A botanical study of the yam beans *(Pachyrrhizus)*.
Mem. Cornell agric. Exp. Stat. **264**, 1944, pp. 38, bibl. 17.
The two principal species of the genus *Pachyrrhizus* (*Leguminosae*) cultivated in Mexico are *P. erosus* and *P. tuberosus*, the watery tubers of which are described as delicious and sweet. The resins present in the cotyledons of the genus are claimed to have insecticidal properties. The genus comprises 6 species, all of which are botanically described.

1955. PINKUS, R. 633.88.51-1.541
El injerto de la chinchona. **(Grafting cinchona.)**
Rev. agric. Guatemala, 1944-5, **1**: 52-5, 135-40.
Shield budding and patch budding have been used more or less satisfactorily in working cinchona in Guatemala, but the author has obtained most success with side grafting, and he describes the method in detail. He recommends *Cinchona succirubra* for the rootstock. The scion sticks are 3 in. long and made into a wedge at the lower end with 2 equal cuts 1½ in. long; the buds, at ½ in. from the upper end, should be in line with the sides not cut. The cut in the rootstock stem is made at 3 to 4 in. above ground level. The ideal stem is a vigorous *succirubra* about 2 ft. high and ⅝ in. in diameter. The best results are obtained in rainy periods (in Guatemala April-June and August-October) particularly in May. The implements and materials used in the operation are described. A disease caused by *Phytophthora* sp. caused a loss of 3·75% of the scions in 1943. The only insect pest necessitating the adoption of control measures is *Poecilocapsus ornatus*. The article includes 10 illustrations from photographs.

1956. KEITH, R. W. 633.912(728.6)
Growing rubber in Costa Rica.
Science, 1945, **101**: 508-9.
The recently initiated programme of growing rubber on small farms in the coastal plains of Costa Rica is described as of great significance in developing unused soil resources and in stabilizing the economy of the tropical lowlands.

1957. WHELAN, L. A. 633.912-1.8
Field experiments on Dartonfield Estate.—XXIII. Measurements of growth in replanted areas 1944.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1944, **21**: 3-6.
The measurements recorded in a fertilizer trial (No. 2 replanting experiment 1938, 19½ acres) indicate that phosphate is the chief requirement on average Ceylon rubber soils, but that on backward areas and for backward trees where the general growth is satisfactory a complete fertilizer should be applied. Another trial (No. 3 replanting experiment 1936, 9½ acres) did not reveal any differences in yield between 3 methods of opening or the effect of organic and inorganic manure. Of the methods of planting compared, stumped buddings were significantly superior to budded stumps in respect of girth increment and yield.

1958. SHARP, C. C. T. 633.912-1.55
The performance of imported clones in Ceylon.—VI.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1944, **21**: 15-20.
A progress report setting forth in 3 tables the yields of a number of imported *Hevea* clones obtained from commercially tapped areas in 1943.

1959. FORD, C. E. 633.912
Planting material and related problems.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1944, **21**: 20-5.
In this address, given to the Kalutara Planters' and to the Southern Province Planters' Associations in June and September, 1944, notes are made on the merits and demerits of the 6 clones approved by the Ceylon Rubber Research Scheme for large-scale planting. The value of tests on estates of 2 further groups of clones recommended for small-scale use is emphasized. Clonal seedlings, the tapping of certain clones, the treatment of valuable young budded trees for brown bast, budwood and stock nurseries are further points discussed.

1960. FORD, C. E. 633.912
Ceylon clones—X (1943-44).
Quart. Circ. Ceylon Rubb. Res. Scheme, 1944, **21**: 25-9, bibl. 1.
A progress report recording the yields from test tapping of the more important Ceylon clones and of a number of isolation garden seedlings at Nivitigalakele.

* See also 1984, 2049-2055.
† For Parts I and II, see *ibidem*, 1941, 96: 265-8, and 1941, 97: 10-3; *H.A.*, 11: 1394 and 12: 248.

1961. MILANEZ, F. R. 633.912: 581.192
Hemicelulose de reserva no embrião de *Hevea brasiliensis* Mull. Arg. **(Hemicellulose as a reserve material in *H. brasiliensis* embryo and its features.)**
Rodriguesia, 1945, No. 18, pp. 43-59, bibl. 30.
The chemical characteristics of hemicellulose found in some quantity in rubber embryo are described.

1962. WHELAN, L. A. 633.912-1.8
Field experiments on Dartonfield Estate—XXIV. Manuring experiment with mature rubber (1943).
Quart. Circ. Ceylon Rubb. Res. Scheme, 1944, **21**: 6-8.
The figures presented appear to indicate that potash may lead to early wintering and phosphate to late wintering.

1963. RUBBER RESEARCH SCHEME (CEYLON). 633.912-1.874
Ground covers.
Advis. Circ. Ceylon Rubb. Res. Scheme **25**, 1945, pp. 9.
The main functions of a ground cover on rubber estates may be defined as protection of the soil from the direct impact of rain and sun, improvement of water absorption and soil aeration and maintenance of the organic matter in the soil. Several leguminous creepers used in the past having gradually deteriorated a few years after establishment, *Desmodium ovalifolium* is now being planted extensively to replace earlier covers. However, it is feared that this species also may not continue to thrive under mature rubber. Hence the policy recommended by the Research Scheme is to retain naturally occurring plants of a desirable type while establishing leguminous creepers. To facilitate the task of selection a list of the more common plants is given under the headings "useful" and "undesirable species", comprising erect shrubs, prostrate and semi-erect plants and creepers. The method of planting *D. ovalifolium* under mature rubber is described. In the absence of an already established cover at replanting the following mixture of creeping and erect legumes is recommended for young rubber: *Calopogonium mucunoides* (1½ lb. of seed per acre), *Centrosema pubescens* (1½ lb.), *Crotalaria anagyroides* (3½ lb.). Cultural directions are given. The forestry system as practised successfully in Malaya, viz. the maintenance of a cover of desirable indigenous plants by the gradual elimination of less desirable growths, has proved unsuitable under mature rubber in Ceylon, but the Malayan "no burn" system for clearings has given excellent results at Nivitigalakele and its adoption is advocated. Under this system 6-foot-wide strips are cleared through the jungle to correspond with the planting rows; the remaining trees are felled and arranged to lie in the areas between the cleared strips. Further points discussed are: Cultivation and manuring of cover crops, rubber manures, control of covers and pests and diseases of covers.

1964. DE SILVA, C. A. 633.912-1.55
Field experiments on Dartonfield Estate—XXV. Comparison of tapping systems.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1944, **21**: 8-15.
A comparison of 11 tapping systems has been carried out for 7 years on trees planted in 2 fields in 1913 and 1917 and manured biennially since 1937. The results of the 7th year and a summary of the results obtained during the first 6 years are presented in the following tables: (1) Mean yield in kg. of dry rubber per plot of 30 trees, (2) adjusted yields as percentage of system No. 1 (control), (3) dry rubber content per cent., (4) number of trees with brown bast, (5) census of diseased and damaged trees (1943-44). An extract from the author's comments seems warranted: "The differences in yield between the tapping systems of 67% intensity are not significant and all show the beneficial effect of the periodic rest in yields considerably above those expected from the intensity of tapping. System No. 7, which is the half-spiral third daily is of particular interest in that it shows the highest dry rubber content figures for the seven years' tapping. It has also given a relatively high proportion of scrap. In recent years system No. 4, two quarter-cuts in echelon, tapped alternate-daily, has shown very satisfactory increased yields over the control. System No. 5, the 'double four', shows only apparent increase of 6·8% over the seven-year period but the general trend of the yields suggests that the system is capable of giving somewhat higher yields than the control alternate-daily, half-spiral system. The 'double three' system No. 8 shows an increase of 20·6% over the control of 1943-1944 and for the seven-year period the figure is 20·4%." The results show that the trees under the conditions of the experiment can stand up to the increased tapping intensity for a number of years at the cost of a small increase in the number of cases of brown bast. As is to be expected, the more intensive systems give the lower dry rubber contents and show the lower scrap yields. None of the figures for brown bast is unduly high or calls for special comment.

1965. RUBBER RESEARCH SCHEME (CEYLON). 633.912-1.55
Tapping young budded [*Hevea*] trees.
Advis. Circ. Ceylon Rubb. Res. Scheme **17**, 2nd Suppl., 1945, pp. 2.
A method is suggested by which pre-coagulation of the latex from young *Hevea* trees may be prevented: Each tapper is provided with a quart bottle fitted with a short bamboo tube held in the neck with a rubber collar. A solution of 2% sodium sulphite or 1% ammonia is placed in the bottle at the rate of 1-2 fluid oz. for each pint of latex likely to be collected. The bottle is then filled with water and well shaken. Immediately after tapping about one teaspoonful of the solution is run down the tapping cut, one quarter of the content of the bottle being poured into the tapping bucket just before collection is started. Ammonia and sodium sulphite may be substituted by ordinary washing soda, made up by dissolving 1 lb. in 5 gal. water.

1966. IMLE, E. P., AND STEVENSON, J. A. 633.912-2.4
***Periconia* blight of the Hevea rubber tree.**
Abstract in *Phytopathology*, 1945, **35**: 486.
A new disease of the Hevea rubber tree is reported from Mexico and Costa Rica; it is caused by an unnamed species of *Periconia*. The symptoms are leaf spots and leaf, petiole, and twig blight on *Hevea spruceana*, and leaf spots and blight on *H. brasiliensis*. The leaf spots are circular or elongated along the veins, and 2 to 10 mm. or more in diameter. On young leaves the spots often coalesce, involving an entire leaflet and causing abscission.

1967. MARTIN, W. J. 633.912-2.19
Chlorosis in seedlings of *Hevea brasiliensis*.
Abstract in *Phytopathology*, 1945, **35**: 487.
Less than 0·1% of the Hevea seedlings growing in nurseries in Mexico and Guatemala has been observed to exhibit a partial chlorosis, ranging in severity from a few well-defined spots on a few leaves to almost complete chlorosis of most of the leaves on some affected plants. The chlorosis has been propagated by patch budding, which suggests that the condition may be transmissible.

1968. FORD, C. E. 633.912-2.411
Experiments on the control of bark rot.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1944, **21**: 29-34, bibl. 4.
A bark rot of rubber different from the normal black stripe was observed at Nivitigalakele in 1940 and diagnosed as canker of the newly tapped bark. Since the S.W. monsoon of 1943 the incidence has assumed serious proportions. The first symptoms of tapping canker consist of small, black, depressed patches, often peppered with a white mycelium ½-1 in. above the tapping cut. In severely affected trees

the patches coalesce and large wounds result. The infection may spread into healthy bark below the cut and into virgin bark above the tapping panel. A secondary effect is the appearance of vertical cracks in renewing bark at the site of naturally-healed patches accompanied by bleeding. The causal fungus was identified as a *Phytophthora* species, possibly a physiological race of *P. palmivora*, the species causing black stripe. A test of several unnamed water-soluble and waterproof disinfectants showed that all treatments under trial will prevent tapping canker and black stripe. The concentration used with the most successful water-soluble disinfectant No. 2 curing the disease in the early stages, viz. small patches, not exceeding ½ in. diameter, was 15% from September to January and 7·5% for the rest of the year. Larger patches of tapping canker must be treated by scraping.

1969. RUBBER RESEARCH SCHEME (CEYLON). 633.912-2.19

The treatment of brown bast.

Advis. Circ. Ceylon Rubb. Res. Scheme **24**, 1944, pp. 4.

The treatment of brown bast, a progressive dying-back of the living substance within the latex vessels resulting from overtapping, has been abandoned in old seedling rubber, but is advocated for budgrafts and clonal seedlings. The disorder being associated with high yields, the improved material is more susceptible to it than unselected seedlings. Brown bast rarely occurs in the first year of tapping and rarely becomes serious before the third year. It is from then onwards that frequent counts should be made of diseased trees, which are recognized by a dry patch 2 in. or more in length on the tapping cuts. The following treatments are suggested: (1) Adoption of a milder system of tapping, if the number of diseased trees reaches 7½% of the total stand. (2) Affected trees to be rested for a month and then brought back into tapping. If the dry area persists, a milder system to be adopted. (3) As an alternative to (2), short dry patches up to 4 inches long may be isolated and tapping continued. (4) Trial to be given to the scraping and/or tapping-off treatments on trees in which the diseased area is spreading.—Research Laboratories, Dartonfield, Agalawatta.

1970. RUBBER RESEARCH SCHEME (CEYLON). 633.912-2.421

***Oidium* leaf disease [of Hevea].**

Advis. Circ. Ceylon Rubb. Res. Scheme **22**, *Suppl.*, 1944, pp. 5.

For an abstract of Circular 22 see *H.A.*, 14: 1917. The supplement gives a detailed account of the technique of sulphur dusting.

1971. RUBBER RESEARCH SCHEME (CEYLON). 633.912-2.421

***Oidium* leaf disease.**

Advis. Circ. Ceylon Rubb. Res. Scheme **22**, 2nd Suppl., 1944, p. 1.

Following the severe losses on mid-country rubber estates due to *Oidium* and subsequent *Diplodia* attack in 1943 and 1944, commercial replanting at elevations above 1,000 feet cannot be recommended until resistant planting material is available or sulphur dusting has been proved to protect young rubber areas.

1972. SIERRA, H. M. 633.912 +633.913

Plantas cauchiferas. El caucho *Hevea brasiliensis*. (**Rubber-producing plants. *Hevea brasiliensis*.**)

Rev. agric. Guatemala, 1945, **1**: 185-93, 261-8, 385-8.

This article begins with an historical survey of the geographical distribution of *Hevea brasiliensis* from its original home in the tropical forests of Brazil. A list is given of 15 farms in Guatemala on which there are plantations or nurseries of Hevea with 850 to 2,800 trees each. It is stated that about 500 species of plants are known to have late containing caoutchouc in amounts ranging from 1% t 35% (in Hevea). The principal rubber-producing plan are *Hevea* (10 species, of which the chief is *H. brasiliensi* the source of the best caoutchouc or Para rubber), *Sapiu* (about 10 species), *Mimusops* (12 species), *Manihot*, *Castillo Hancornia*, *Parthenium argentatum* (guayule), *Taraxacu kok saghyz*, *Cryptostegia madagascariensis*, *Ficus elastic* Of these, castilla, kok saghyz and guayule are brief described in relation to their production of rubber. Th yield per acre of kok saghyz is much lower than that hevea, but it yields its crop in the year of planting and was largely cultivated during the war years, for hevea tak 7 years and guayule 4 years before it can be tapped f rubber. The latex of castilla and guayule has the disadva tage that it contains a high proportion of resins and prote substances. Because of its importance hevea is treat more fully, and an account is given of (1) raising rootstoc from seeds, (2) the maintenance of "clonal gardens where varieties of known value are propagated for budwoo (3) the planting out and later attention of the rootstock (4) treatment of budwood received from elsewhere—t removal of buds and their insertion in the rootstock sten

1973. BLAIR, E. M., AND FORD, T. F. 633.913

Castilla as a western hemisphere rubber.

Industr. Engng Chem. (*industrial edition*), 1945, **37**: 760-6, bibl. 16.

The possible future significance is discussed of Castil rubber in Latin America, where it could be produced wi advantage by small farmers as a secondary or cash cro Although the yield of trees, *Castilloa elastica*, *C. ulei*, et which are tapped 2-3 times a year, is inferior to that *Hevea*, the output per man-hour is higher, cultural ar tapping operations requiring less care. Castilla trees appe to be resistant to most diseases, and the quality of the rubb is reported to be good. The article furnishes informati on the physical characteristics of the tree, its rate of grow and habitat, propagation methods (from seed), diseas (root rot caused by poor drainage and a high water tab and insect pests (bark beetle), yields, properties of late quality of rubber, tapping and labour and methods rubber preparation. Finally, the problems are survey which want tackling by scientific methods, such as selectio determination of resin content in relation to age of tr etc., etc.

1974. SCHMIDT, G. A., AND MARCUS, A. 633/635: 551.566.1

Handbuch der tropischen und subtropischen Landwirtschaft. (**A manual of tropical and subtropical agriculture.**)

E. S. Mittler u. Sohn, Berlin, 1943, 2 Vols., pp. 1772, RM. 45.—, from review *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 29.

The detailed treatment includes fibre, rubber, resin, tann and oil yielding plants, fruit, vegetables, spices, drug a medicinal plants and dye and ethereal oil yielding plants.

1975. MOWRY, H., TOY, L. R., AND WOLFE, H. S. 634.1/7: 551.566.1(759)

Miscellaneous tropical and sub-tropical Florida fruit.

Bull. Fla agric. Ext. Serv. **109** (*Rev. Bull.* **85**), 1941; pp. 96.

The generously illustrated description, in alphabetical ord of more than 200 species of Florida tropical and sub-tropi fruit includes a large number of miscellaneous species, whi by actual trial have shown their adaptability to Flori conditions, but are not yet grown in quantity.

1976. JULIEN, J. H. 634.39-1.535

Propagation of the bread fruit (*Artocarpus incisa*) by the "solar propagator".

Rev. agric. Maurice, 1945, **24**: 31-3.

The method of propagating bread fruit described with t

help of illustrations in this article was developed at Rodriguez, where the root sucker method commonly used in Mauritius proved to be very slow and unreliable. Cuttings from freshly dug roots, 8 in. long and $\frac{3}{16}$ to $1\frac{1}{4}$ in. in diameter are dipped in a 2% solution of potassium permanganate (to coagulate the latex), placed horizontally on a sand bed, the "solar propagator", and covered with a layer of sand $\frac{1}{2}$ in. deep. This germinating bed is watered every morning. After 45 days a large number of the cuttings will have developed tiny gall-like protuberances, from which adventitious shoots will be formed a week after all cuttings bearing these structures have been grouped together and laid flat on the propagating bed with the protuberances facing upward, covered with sand to a depth of $\frac{1}{2}$ in. As soon as the suckers bear a leaf the cuttings are ready for potting out into specially constructed pots, which will allow the final transplanting to be done with a minimum of injury to the roots, the soil mixture consisting of 25% leaf mould (by volume), 25% sand and 50% light soil without manure. The end nearest to the sucker of cuttings, which have developed a sucker only or a root system on one end only, is dipped in 0·5% permanganate solution and coated with paraffin wax. The cuttings are then planted in the pot in a slantwise position with the treated end up and placed in a shed under light shade for about 2 months. By that time the young plants will have reached a height of 7-12 in. and they may be gradually hardened up. The treatment, for which 80% success is reported, is applicable only during the warm months from August onwards.

1977. MUSTARD, M. J., AND LYNCH, S. J. 634.441: 577.16

Effect of various factors upon the ascorbic acid content of some Florida-grown mangos.

Bull. Fla agric. Exp. Stat. **406,** 1945, pp. 12, bibl. 10.

The ascorbic acid content of mango fruits at maturity from 32 mango varieties growing in southern Florida was determined and average values were found to range from 107·4 mg./100 g. in No. 11 to 8·8 mg./100 g. in Apple. No definite conclusions could be reached on the effect of location on vitamin C content. The ascorbic acid content of mango fruits was found to decrease with increased distance from the skin.

1978. COLWELL, W. E., AND BRADY, N. C. 634.58-1.821

The effect of calcium on yield and quality of large-seeded type peanuts.

J. Amer. Soc. Agron., 1945, **37**: 413-28, bibl. 5, being *J. Ser. Pap. N.C. agric. Exp. Stat.* **202.**

The problems studied in this detailed investigation include comparisons of 2 different practices of supplying calcium and the placement of gypsum in relation to yield and quality of large-seeded type peanuts, mainly of the Virginia Bunch variety, the fruiting of which requires a high level of calcium. Further, a classification system is described which guarantees increased accuracy in measuring fruit quality. The results show (1) that the placing of gypsum on top of the row at the time of early bloom is far superior to dolomitic limestone applied in the row at the time of planting in cases in which the calcium content of the entire field cannot be raised to the desirable level (in view of other crops in the rotation) and localized applications are necessary; (2) that the addition of gypsum to the fruiting zone of the soil at early blooming is an efficient means of improving yield and fruit quality, while no response was obtained from applications in the rooting zone. Under the conditions of the experiment, however, 30-60% of the ovarian cavities remained unfilled in spite of the addition of gypsum to the fruiting medium. A high yield of good quality fruit was produced on a soil with a calcium content of 2·21 M.E. per 100 grams without supplementary calcium. The calcium content of soils on which gypsum proved beneficial varied from 0·21 to 1·39 M.E. per 100 grams.

1979. BRADY, N. C., AND COLWELL, W. E. 634.58-1.8

Yield and quality of large-seeded type peanuts as affected by potassium and certain combinations of potassium, magnesium and calcium.

J. Amer. Soc. Agron., 1945, 37: 429-42, bibl. 5, being *J. Ser. Pap. N.C. agric. Exp. Stat.* **203.**

"Increased yields [due to larger plant size] from the use of potash may be expected when (*a*) there is an adequate supply of calcium to bring about good filling of fruit, and (*b*) when the level of soil potassium is extremely low." These conclusions were reached as the result of trials in which the effect on large-seeded peanuts of potash applications to the rooting and fruiting zones was studied on soils with widely different characteristics. Magnesium applications were found to affect kernel development unfavourably, unless supplied to the rooting zone in the absence of potassium applications to the fruiting zone. The effect of different mineral treatments on the oil composition of well-developed kernels was negligible, while large and medium-sized wrinkled kernels were shown to benefit slightly from added calcium.

1980. MIDDLETON, G. K., AND OTHERS. 634.58-1.8

The behavior of four varieties of peanuts as affected by calcium and potassium variables.

J. Amer. Soc. Agron., 1945, 37: 443-57, bibl. 9, being *Pap. J. Ser. N.C. agric. Exp. Stat.* **204.**

A study was made of the response of 4 peanut varieties (large-seeded type to small-seeded type) to calcium and potassium treatments on soils with low contents of these minerals but representative of the land cropped to peanuts in the southern Coastal Plain area of North Carolina. The varieties tested, Virginia Bunch, North Carolina Runner, Spanish 23 and White Spanish, showed pronounced differences in their calcium requirements, that of Virginia Bunch being by far the highest, while the increase in yield produced by added potash was small in all cases. Findings previously reported for Victoria Bunch are confirmed for all 4 varieties: (1) That potash applications affect yield only indirectly by increasing plant size and (2) that fertilizers have but little influence on the oil content of kernels. The latter was also found to be little affected by variety.

1981. MCCLELLAND, C. K. 634.58

Peanut production experiments, 1931-41.

Bull. Ark. agric. Exp. Stat. **448,** 1944, pp. 27.

As the result of 10 years' experiments on peanut production conducted at the Main and the Fruit and Truck Branch Experiment Stations in north-western and south-western Arkansas respectively, the Spanish strains are recommended as the highest yielders of nuts, hay and oil. The most successful local and Spanish varieties are named, their yields averaging about 1,500 lb. per acre spaced 30-36 × 8 in. Shelling percentages of the Spanish types ranged from 69% to 80%, the number of peanuts per lb. showing a wide variation. A considerable increase in yield was the response obtained from lime applications to an acid soil (pH 5·42-5·65). The peanut area in Arkansas expanded from 10,000 acres in 1909 to 57,000 in 1939.

1982. BATTEN, E. T. 634.58

Peanut production.

Bull. Va agric. Exp. Stat. **348,** 1943, pp. 15.

In 1942, peanut production ranked fourth both in acreage and money value of all crops grown in Virginia. At present, peanut growing in the state is practically confined to 8 counties south of the James River, but trials have shown that a wider area, which is delineated, is suitable for the crop. The subject is dealt with in this bulletin under the following headings: Uses of peanuts, soil adaptation, varieties of peanuts, preparation of seed for planting, preparation of the land, planting, fertilizers for peanuts, lime for peanuts, rotations for peanuts, cultivation of peanuts, time of harvesting, methods of harvesting, picking, insect and disease control.

1983. TISDALE, W. B. 634.58-1.531.17
Treat peanut seed for better stands.
Pr. Bull. Fla agric. Exp. Stat. **610,** 1945, pp. 4.
The unfavourable effect of machine-shelling on the stand of peanuts should be counteracted by one of the following three seed treatments: Arasan, ½ teaspoonful; 2% Ceresan, ½ teaspoonful; Spergon, ½ teaspoonful per lb. of seed. The barrel treater, of the type in common use for treating cotton seed, is recommended as the most suitable machine for treating large quantities of seed. The barrel should be half filled with clean and dry seed to which the correct amount of dust is added. The treatment (5 minutes) may be applied at any time within 30 days before planting, but preferably immediately after shelling.

1984. MICHAUX, R. M. E. 634.6+633.85
Création d'un institut de recherches pour les huiles de palme et oléagineux. **(The establishment of a research station for palm and other oils.)***
Bull. Mat. grass., 1942, **26**: 235-40.
A new oil research station the "I.R.H.O." was established at Paris, 12, Square Pétrarque (XVI[e]) on 29 January, 1942, and its aims and programme are here set out by its president. Its aim apparently was not only to act as a clearing house of information at Paris but also to establish an oil palm research station on the Ivory Coast which would be provided with modern equipment and enough land to carry out commercial scale trials on cultivation and extraction. The *Bulletin des Matières Grasses* became its official organ as from Vol. 26, No. 10 inclusive. [It is interesting to note that a later article, *ibid.*, 1943, 27: 23-5, gives a programme of lectures and meetings arranged by the new institute for the spring of 1943 in Paris, which would presumably serve as an introduction to those wanting to study the different aspects of oil production. Some of these lectures are reproduced in subsequent numbers, e.g. The selection of the oil palm, *ibid.*, 1943, 27: 109-26.]

1985. ALIBERT, H. 634.6: 581.162.3
Pourquoi et comment on fait la fécondation artificiel sur le palmier à huile. **(Artificial pollination of the oil palm.)**
Farm and Forest, 1945, **6**: 27-30.
The author does not think that for Ivory Coast conditions artificial pollination of young oil palms is economic, since, although the yield is very greatly increased, the trees in the absence of manuring are rapidly exhausted by the process. For genetic studies, however, or to ensure self-pollination, or pollination from particularly desirable other plants, the practice has much in its favour. In this article the whole process of taking and keeping the pollen and of pollinating the flowers is discussed in detail.

1986. LYNCH, S. J. 634.441-1.541
Nursery propagation and topworking of mangos.
Pr. Bull. Fla agric. Exp. Stat. **560,** 1941, pp. 4.
Nursery propagation of mangos by veneer grafting, shield budding and inarching is described and illustrated. There are two ways of topworking: (1) Pruning back the branches to within a foot of the trunk and budding or grafting the strongest shoots which issue from the stub; this is slower and surer than (2). (2) Cleft grafting (illustrated). Budding is done when the rootstock is at the very beginning of a flush of growth, in Florida normally in May or June, while the months June to August have proved most successful for grafting.

1987. STEPHENS, S. E. 634.771
Banana culture in tropical Queensland.
Qd agric. J., 1945, **60**: 137-53.
A return of the banana industry to North Queensland being anticipated, the requirements of the crop and the cultural practices to be followed are described. Paragraphs suitable varieties, pests and diseases and replanting included.

1988. ANON. 634.774
Piña. **(The pineapple.)**
Rev. agric. Guatemala, 1945, **1**: 269-82.
The pineapple originally found in tropical America is n cultivated principally in tropical islands, e.g. Hawa Martinique, Puerto Rico, Cuba, Guadaloupe, Formo etc., but it is also grown in the Guianas and in the coas regions of Central America. A brief description of t plant is given; after fruiting the main stem dies, leavi suckers which fruit in their second year. Many variet are grown in tropical and sub-tropical regions: the auth extols Smooth Cayenne, a yellow variety of excellent flavo and ideal for preserving in containers for exportation. T varieties are distinguished by certain more or less importa characters, e.g. presence or absence of spines on the leav the colour of the flesh of the fruit, the weight, form and s of the fruit, and particularly the qualities that render palatable when eaten or preserved. With regard to t cultivation of the pineapple the following points are d cussed: (1) the conditions under which it thrives—the s must be kept fertile or the fruit will be small and acid fr lack of mineral salts; there must be sufficient assimilal potassium and phosphorus to produce sweet pineappl (2) the preparation of the soil, (3) propagation, by sucke or by shoots that appear at various levels on the main ax (4) the lay-out of the plantations—the double row syst is recommended, particularly when the cultivation is do by machines, (5) precautions to be taken when planting u (6) cultivation and care during the growing season, (7) t crop, time and method of collecting, grading, packi (8) the value of the fruit, its high sugar and vitamin conte its yield of the digestive ferment bromeline and citric ac (9) its preparation for canning.

1989. CARTER, W. 634.774-2.752
Some etiological aspects of mealybug wilt.
Phytopathology, 1945, **35**: 305-15.
The influence of plant nutrition on susceptibility of pineapple plants to mealybug wilt.
ibid., **35**: 316-23.
Symptom expression of mealybug [*Pseudococcus brevip* wilt is shown by 4 progressive stages and 1 recovery sta The period for the development of symptoms (from 43 295 days) is affected by the age of the plant at time infestation. High nitrogen application appeared to redu susceptibility, but in one test only. Recovered plants a susceptible to later infestation and will wilt a second tim Adverse growth conditions increased the susceptibility these plants to a second wilting.

1990. HAHN, F. L. 634.776
Naranjilla, *Solanum quitense*.
Rev. agric. Guatemala, 1944, **1**: 15-7, 37.
The "naranjilla" is cultivated in the sub-tropical regio of Ecuador and in the south of Colombia. The fruit said to have a delicious flavour comparable with that both pineapple and orange. The author grew the pla successfully on a plot at the Guatemala National Institu of Agricultural Chemistry, showing that it can be grown that country. As the demand for the fresh fruit is ve limited the question of concentrating the juice for exportati is discussed.

1991. ANON. 635.35: 631.531
Instrucciones para la produccion de semillas de coliflor. **(Recommendations on cauliflower seed production.)**
Rev. agric. Guatemala, 1945, **1**: 140-1, 149.
It is recommended that cauliflowers for seed should be gro at an altitude of a minimum of 1,200 metres (in Guatemal Since the floral mechanism of cruciferous plants favou

* See also 1951, 2049-2055.

cross pollination, the different varieties should be grown at some distance from each other in order to maintain purity of strain. There should be no other cruciferous plants flowering at the same time within 500 metres. Advice is given on manuring, securing the crop of seed, and treatment for pests and diseases.

1992. Alvarez García, L. A., and Adsuar, J. 635.64: 632.8
Studies on tomato mosaic in Puerto Rico. A new mosaic disease of tomato. [Spanish summary ½ p.]
J. Agric. Univ. Puerto Rico, 1943, **27**: 141-8, bibl. 16.

The symptoms of a new mosaic disease of tomato, which is mechanically transmitted and was proved to be due to the pepper virus, are described and illustrated in a colour plate. There leaf deformation and a peculiar purplish coloration of growing tips is shown, followed by necrosis and black longitudinal streaks on stem and branches. The cutting of affected plants and letting them dry *in situ* is suggested as a possible control measure. Pepper, of course, is an important source of infection in Puerto Rico, where the investigation was carried out. The theoretical implications of the discovery are discussed.

1993. McCubbin, W. A. 635.653: 632.4
Observations on lima-bean scab in Puerto Rico. Abstract in *Phytopathology*, 1945, **35**: 488.

Lima-bean scab (*Elsinoë phaseoli*) occurs in Puerto Rico on cultivated and semi-wild lima beans [*Phaseolus lunatus*] and has been frequently seen in the inspection of pod lima beans offered for shipment to the mainland since 1930. Following pod infection there is a rapid expansion of the scab spot, which at this stage is slightly raised, uncoloured, and produces a copious but transient crop of conidia.

1994. Bond, W. E. 635.976: 551.566.1
Suitability of various hedge plants and live fencing poles in Northern Nigeria.
Farm and Forest, 1945, **6**: 22-6.

The author divides his hedge plants into shrubs planted close together so as to form an impenetrable hedge and live stakes planted in rows, usually not more than a yard apart, to which mats, cornstalks or wire can be tied to make a fence. Notes are given of the growth and relevant qualities of 14 shrubs, of which the following would appear to possess the fewest snags:—*Euphorbia balsamifera* and *E. lateriflora*, *Furcraea gigantea* (Mauritius hemp), *Citrus aurantifolia*, *Balanites aegyptiaca* (Desert date) and *Garcinia* sp. (Gamboge). The soil and rainfall requirements of the above are noted. In addition 10 species are discussed which come under the category of live stakes. The following are commended on particular grounds:—*Commiphora kerstingii*, *Newbouldia laevis*, *Cassia siamea* and *Glyricidia maculata*. There is, of course, a disadvantage in the spoliation of the soil by the roots of these living fences and what this signifies is discussed in more detail as affecting *N. laevis* and *Azadirachta indica*. Neither of these should be planted round farms or paddocks as their roots grow from a few inches to a foot below the surface of the soil and spread considerably, causing patchiness in crops and grass. The editor notes that the same is probably true of *Cassia siamea*.

1995.

a Alvarez García, L. A. 632.4: 635.1/7
***Acrothecium* leaf spot of *Basella rubra* L.** [Spanish summary 1 p.]
J. Agric. Univ. Puerto Rico, 1943, **27**: 149-67, bibl. 10.

b Baptist, B. A. 632.6/7: 351.823.1
The scope and function of plant protection legislation in Ceylon with special reference to insect pests.
Trop. Agriculturist, 1943, **99**: 221-30, bibl. 7.

c Capó, B. G. 519: 63
A method of interpreting the results of field trials.
J. Agric. Univ. Puerto Rico, 1944, **28**: 7-21, bibl. 4.

d Capó, B. G. 519: 63
A new method of performing field trials.
J. Agric. Univ. Puerto Rico, 1944, **28**: 22-34, bibl. 1.

e Deulofeu, V., and others. 633.88.51
Fagarine, a possible substitute for quinidine.
Science, 1945, **102**: 69-70, bibl. 10.

f Moreau, R. E. 016: 633.88.51
An annotated bibliography of *Cinchona*-growing from 1883-1943. Part I. Annual reports devoted to or regularly containing references to *Cinchona*.
Publication (out of series) *East African Agricultural Research Institute, Amani*, 1945, pp. 41.

g Watson, J. R. 634.58-2.6/7
Peanut insects and other enemies.
Pr. Bull. Fla agric. Exp. Stat. **585**, 1943, pp. 4.

STORAGE.

1996. Kessler, H. 664.85
Obstlagerung. **(Fruit storage.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 354-62, being *Flugschr. Wädenswil Versuchsanst. Obst.-Wein und Gartenbau*, **29**.

The bulletin is an introduction to apple storage under Swiss conditions, dealing with the selection of suitable varieties, grading, disinfection of boxes, their arrangement in the cellar, the influence of temperature and relative humidity and different cellar types. For a description of the air-cooled cellar, developed at Wädenswil Research Station, see *ibid.*, 1943, 52: 589-92; *H.A.*, 14: 937 (4). Old cellars blasted into rocks for the storage of beer may also be mentioned in this context as a type of cellar characteristic of the country.

1997. Kessler, H. 664.85
Der luftgekühlte Keller im Dienste der Obstlagerung. **(The air-cooled cellar for storing fruit.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 337-49, bibl. 3.

For a description of the air-cooled cellar see *Landw. Jahrb. Schweiz.*, 1942, 56: 344-56; *H.A.*, 12: 1531 or *Schweiz. Z. Obst-u. Weinb.*, 1943, 52: 589-92; *H.A.*, 14: 937 (4). It was the object of the investigation reported in this Communication from the Swiss Horticultural Experiment Station, Wädenswil, to test the suitability of the air-cooled cellar for storing apples. The study was carried out with 6 varieties in 3 cellars, at (1) Wädenswil, one storey (basal surface 27·3 m²; ratio of cubic content: cross section of ventilation channels, 56·3m³: 0·63m² or 100m³: 1·12m²), (2) Neukirch-Egnach, two storeys (106·6m²; 234·5m³: 2·34m² or 100m³: 0·997m²) and (3) Châteauneuf, one storey (53·3m²; 127·9m³: 1·2m² or 100m³: 0·93m²). Four of the varieties, which with the exception of Ontario are not generally known in England, were considered to keep well in all 3 cellars, the loss due to rotting being 10-12% and the total loss in weight including the loss of water being confined to 14-17% after 94 days in the case of one variety and after 134 days in the case of 3 varieties. On the strength of these results the air-cooled type of cellar is recommended for apple storage in Switzerland with the reservation that the cellar temperature will always to a certain extent depend on the temperature outside and that ideal cool storage conditions cannot be attained.

1998. ANON. 664.85+664.84
Cold and gas storage of fruits and vegetables in Bombay.
Ind. Frng, 1945, **6**: 90-3.
A summary of the results obtained in fruit and vegetable storage trials at the Ganeshkhind Fruit Experimental Station, Kirkee, including the following points: *Mango*. The Alphonso variety was found to keep the best in cold storage. Picked at a stage when the fruit is oil green in colour and when the shoulders have outgrown the stem end, Alphonso can be preserved at 45-48° F. for 7 weeks and subsequently ripened at room temperature. The stage of maturity at picking was a much more important factor than fruit size. The trials showed that the Alphonso mango may be shipped to foreign markets, provided cold storage is available and the journey is limited to a month. Gas storage proved unsuitable. *Nagpur orange* or *santra*. Fully ripe yellow fruits were kept in good marketable condition for 3 months at 40° F. *Mosambi*. The normal pale yellow colour of the fruit develops into a deep and uniform orange colour after 2 months' storage at 52° F., during which period the juice quality also improves. Small fruits tended to shrivel. *Malta oranges* could be kept in good condition at 40° F. for 4 weeks, the storage behaviour being influenced by size. *Lime*. Kagadmi limes placed in partially closed tins were stored for a month at ordinary low temperature and for 2 months at 52° F. *Banana*. The Sonkel variety picked in a green but mature stage ripened properly in storage at 68°, 60° and 56° F. and at the last temperature remained in good condition for 4 weeks. The behaviour of other varieties is also discussed. *Apples, pears* and *peaches*. Delicious and Amri apples kept in good condition for more than 8 months at 32° and 35° F., the weight loss of Delicious during the storage period being less than 10%. Williams pears and Elberta peaches stored well for 4 months and 4 weeks respectively at temperatures of 32° F. and 32°-35° F. *Pineapples* (*Queen*). Ripe fruit was kept for a month at 30° [sic]-52° F. *Papaya*. Temperatures higher than 68° F. are useful for the ripening of the fruit, which however cannot last for a long time. *Onions* remained dormant for a year at 90-95° F. or for 6 months at 32° F. Onions fully developed at the time of harvesting suffered the least loss in weight. Further data are given on the storing of peas, cabbage, cauliflower, carrots, French beans, tomatoes and potatoes. On the whole, the results indicate the desirability of introducing scientific storage and transport methods for the marketing of Indian fruits and vegetables. The adoption of the suggestions made may lead to a successful export of Indian fruits to foreign markets.

1999. ÖSTLIND, N. 664.85.11
Orienterande lagringsförsök med äpple 1942-1943. **(Preliminary storage trials with apples 1942-43.)**
Reprint from *Årsskr. Alnarps Lantbruks-, Mejeri- och Trädgårdsinst.*, 1943, pp. 41-52, bibl. 16, being *Meddel. Statens Trädgårdsförsök* **20**.
The apple varieties used in these storage trials at Alnarp were: Cox's Orange, Cox's Pomona, Gravenstein and Filippa. A comparison of fruits stored in ordinary, ventilated fruit cellars with those kept in cool storage showed that a storage temperature of 1·5-2·5° C. greatly reduced loss of weight and of vitamin C, although large and less firm fruits from young vigorous trees were found to suffer some slight cold injury. Of the varieties tested Filippa proved particularly suitable for cool storage and the loss of weight in Cox's Orange was much higher than in Filippa. Loss of weight in Cox's Orange was found to vary with the rootstock, being light in fruits grown on EM IX and heaviest in fruits grown on EM XVI. Wrapping in oiled paper reduced weight loss in Filippa but not in Gravenstein.

2000. HALL, E. G. 664.85.037+664.84.037
The preservation of fruits and vegetables by quick freezing.
J. Aust. Inst. agric. Sci., 1944, **10**: 114-21, bibl. 22.
The establishment of a quick freezing plant in Sydney being imminent and a large-scale expansion of the industry over Australia being anticipated in the near future, the development of the quick freezing method in the U.S.A. is reviewed.

2001. KESSLER, H. 664.85.037
Die Produktion von Gefrierkonserven, ein entwicklungsfähiger Zweig der Obstverwertung. **(Quick freezing, a promising method of fruit utilization in Switzerland.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 22-6.
The development of the freezing industry abroad is surveyed and it is estimated that in recent years the production of frozen preserves in Germany amounted to about 140,000 tons. Facilities for freezing fruits and fruit juices were established by the Germans in Bulgaria, Roumania, Southern France and Italy, and serious competition on the Swiss market may be expected if the Swiss do not go ahead themselves. The results of freezing trials with cherry, raspberry and strawberry varieties undertaken at Wädenswil are briefly summarized, and the utilization of frozen fruits in the confectionery trade is discussed.

2002. RUDORF, W. 664.84/85.037
Die Pflanzenzüchtung im Dienst der Konservierung von Obst und Gemüse. **(Plant breeding as an aid to the preservation of fruit and vegetables.)**
Forschungsdienst, 1944, **17**: 583-90, bibl. 8.
A general discussion of the problem. Freezing at low temperatures is described as the most suitable method of preservation used in Germany.

2003. TROUT, S. A., AND HALL, E. G. 664.84.11.038
Extending the storage life of apples with skin coatings.
Food Pres. J., 1944, **4**: 4: 8-9.
A progress report of the authors' investigations on the effect of skin coatings upon the storage life of New South Wales apples, which have not yet led to definite recommendations. The merits and demerits of treatments with the following agents are discussed: a solution of castor oil and shellac in alcohol, wax emulsions, emulsions of a heavy medicinal paraffin oil and of lighter mineral oils.

2004. KESSLER, H. 664.85.11
Die Beeinflussung der Wasserabgabe leicht schrumpfender Lagersorten. **(Storage trials with dipped apples.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 335-9.
Dipping apples of varieties, susceptible to shrivelling in storage, into Obscol emulsion had little beneficial effect. It is therefore expected that the old method of storing apples in paper strips impregnated with mineral oil will be resorted to again as soon as materials are available.—Horticultural Research Station, Wädenswil.

2005. BAJWA, S. B. S., AND SINGH, S. K. 664.853.037
Cold storage of citrus fruits.
Punjab Fruit J., 1945, **9**: 117-8.
Investigations on the cold storage of citrus fruits were made at Lyallpur under the Cold Storage Research Scheme 1938-42, and the following results were obtained: At a temperature of 36-39° F. representing the optimum for Malta and Sangtra oranges, Malta Common was found to keep in an excellent condition for 17 weeks, Bloodred for 13, Valencia Late for 19, Seville for 13 and Musambi for 12 weeks. Sangtra orange from two localities had a storage life of 4-5 weeks, but the tight-skinned Nagpuri Sangtra was kept for 4 months. Grapefruit and lemon remained in excellent condition for periods of 13 and 9 weeks at temperatures of 45-48° F. and 36-39° F. respectively.

2006. TINDALE, G. B. 664.85.323
Grapefruit storage trials.
J. Dep. Agric. Vict., 1945, **43**: 352-3.
Storage trials on a limited scale showed that grapefruit in Victoria will keep for a period of 3 months if coated and stored at 55° F. A proprietary emulsion of various waxes to which 0·25% "Shirlan" as a fungicide was added proved very effective as a skin-coating agent, preventing shrivelling of the fruit and preserving the bright appearance of the skin. The percentage of mouldy grapefruit in September-picked fruit, which was affected by frost, was reduced to 23 after 3 months' storage as compared with 52 in the controls. The incidence of mould attack was very much less in December-picked fruit (12-16% after 3 months), which did not derive any benefit from treatment with the fungicide.

2007. KENKNIGHT, G. K. 664.84.25: 632.1/8
Control of storage diseases of onions.
Circ. Idaho agric. Exp. Stat. **92**, 1944, pp. 4.
The most serious storage diseases of onions in Idaho are neck rot and bacterial soft rot. Control measures suggested for these and other diseases include a relative humidity of 65% and a temperature of just above freezing point during storage (in well-ventilated crates). Mother bulbs for planting should be held at 45-55° F.

2008. TRUSCOTT, J. H. L. 664.84.53: 632.4
A storage rot of celery caused by *Ansatospora macrospora* (Osterw.) Newhall.
Canad. J. Res., 1944, **22**, Sec. C, pp. 290-304.
The damage caused by this rot, in Ontario, varies in degree to complete destruction of the stored celery. Most of the losses are caused by lesions that develop in the celery butts. Practical control of the disease was obtained by dipping the trimmed butts, at harvest, in a watery mixture of phenylmercuric acetate.

2009. TIDBURY, G. E. 664.84.22
Storing sweet potatoes in Zanzibar.
E. Afr. agric. J., 1945, **11**: 34, bibl. 4.
Testing several methods of storing sweet potatoes under Zanzibar conditions, the author found that drying of slices, less than a quarter-inch in thickness, of uncooked tubers will give good results. Previous peeling is recommended. Sun-drying was found to be just as successful as kiln-drying. After 5-6 months storage the dry slices were still in a fair condition.

2010. LINSLEY, E. G. 663.8: 632.6/7
Natural sources, habitats, and reservoirs of insects associated with stored food products.
Hilgardia, 1944, **16**: 187-24, bibl. 117.
We have heard plenty of what insects do when they are enjoying stored products but little of whence they come and how they spend their leisure hours. Here it is, all in a nutshell, and of great potential value to those seeking to control these pests.

2011.

a BAKER, C. E., AND MAYER, I. D. 664.85.11
Air-cooled apple storages.
Circ. Ind. agric. Exp. Stat. **154** (revised), 1940, pp. 26.
Types described and illustrated.

b HIENTON, T. E., AND FAWCETT, K. I.
664.85.75.037 + 664.84.611.037 + 664.85.25.037
Precooling tests of Indiana strawberries, cantaloupes, and peaches.
Bull. Ind. agric. Exp. Stat. **439**, 1939, pp. 36, bibl. 10.

c LERCH, K. 664.85 + 664.85.047
Obstkeller und Dörranlagen in bäuerlichen Betrieben. (**The construction of cellars for fruit storage and the kiln drying of fruit on small farms.**)
Reichsnährstandsverlag G.m.b.H., Berlin, 1944, pp. 87, 58 illustr., RM. 2.25, from review *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 32.

PROCESSING AND PLANT PRODUCTS.

2012. CRANG, A., AND OTHERS. 664.85.035/036
A comparison of methods of preserving fruit.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 199-208, bibl. 4.
A comparison was made with apples, blackberries, black currants, cherries, damsons, gooseberries, loganberries, plums, raspberries, red currants, rhubarb and strawberries preserved by 9 different methods of bottling and canning and 4 methods of making fruit syrup. The sterilization of fruit by heat was more reliable than preserving it in the cold with sulphur dioxide. Fruits sterilized in bottles by slow heating in water were generally superior in quality to fruits preserved by the other methods. The pectin and setting quality of the fruit for jam-making was satisfactory in products preserved by the heat methods, but there was, in most cases, a considerable loss of both in the fruits preserved with sulphur dioxide in the cold. This was greater in the soft fruits than with stone fruits and apples. Fruit syrups made by slowly heating the fruit to extract the juice were preferred to those in which the fruit was softened in the cold with a pectin-decomposing enzyme. The flavour of the heat-sterilized syrups was also preferred to those preserved with sulphur dioxide. [Authors' summary.]

2013. CRUESS, W. V. 634.11-1.57
Notes on apple products in the Yakima area.
Fruit Prod. J., 1945, **24**: 292-5.
A report of a visit to the apple products plants in the Yakima district, where the cull fruit is processed on a large scale, with notes on a number of products. The post-war prospects of the industry, which so far has been producing almost exclusively for the Army and Lend Lease, are discussed.

2014. KESSLER, H., WIDMER, A., AND ZÜLLIG, E. 664.85
Die Verwertung des Obstes. (**Fruit utilization.**)
Huber & Co. A.G., Frauenfeld, 1945 (?), 8th edition, pp. 154, Fr. 4.20, from review *Schweiz. Z. Obst-u. Weinb.*, 1945, **54**: 189.
The eighth edition of this popular book incorporates the latest developments within its scope. The chapters on fruit drying and on the preparation of fruit wines have been re-written.

2015. HUNT, L. W., SUNNELL, A., AND PFAFF, A. 613.2
The effect of preservation on the nutritive value of food.
Pop. Bull. Wash. agric. Exp. Stat. **175**, 1944, pp. 24, bibl. 34.
A survey of the available information on the effect of different processes applied in canning, freezing and dehydrating fruits and vegetables (and other foods) upon the nutritive value of the product. The effect of storage on the retention of vitamins in the several processed foods is also discussed.

2016. MATHOT, H. J. 633.491: 577.16
Het vitamine-C-gehalte van vroege aardappelen, bepalingsmethode en oriënteerend onderzoek. (**The vitamin C content of early potatoes, method of determination and application to the investigation.**)
Meded. Inst. Onderz. Fruit Groenten, Wageningen, 1943, Ser. 1, No. 10, 18 pp.
Investigations have shown that the best method of

determining the vitamin C content of potatoes is a warm extraction in a 2% HPO_3 +4% H_2SO_4 medium under CO_2; in the extract the ascorbic acid has to be determined with 2·6 dichlorphenol indophenol. Dehydroascorbic acid is not involved in this experiment as it cannot be found in large quantities after a warm extraction. The last mentioned fact indicates the possibility that the acid does not occur as such in the potato but is formed as a result of the extraction. Ascorbic acid is not equally distributed among the various tissues. The amount increases from the epiderm to the cambium; after a sudden fall it increases again right into the centre of the potato. The line running from hile to top forms a multilateral axis of symmetry in relation to the distribution of the ascorbic acid. No relation could be found between the ascorbic acid of a tuber and its location on the plant. After lifting, the amount decreases very slowly. Peeled potatoes lose a part of the ascorbic acid by storage in water. After storage in air there is an apparent increase in the amount of ascorbic acid. [From author's summary.]

2017. James, D. P. 577.16: 634.1/8: 581.192
Riboflavin in fresh fruits.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 166-71, bibl. 9.
In experiments at Bristol University the riboflavin content of 2 to 7 samples of 11 fruits was determined by the microbiological method and is here shown. The fruits were:—black currant (Westwick Choice), cultivated blackberry, damson (Shropshire Prune), raspberry (Lloyd George and Norfolk Giant), strawberry (Royal Sovereign), pear (Bristol Cross and Conference), tomato, loganberry, gooseberry (Keepsake, Leveller, and Whinham's Industry) apple (Allington and Bramley), plum (Victoria and Giant Prune). Examinations of riboflavin distribution in pears, apples and tomatoes showed that both the peel and the core contained higher percentages than the flesh.

2018. Kendrick, S. G., and Downer, A. W. E. 664.85.723.037: 577.16
The retention of vitamin-C during the "cold process" preservation of blackcurrants.
J. Soc. chem. Ind. Lond., 1945, **64**: 145-7, bibl. 7.
Storing casks of black currants covered with bisulphite preservative solution in the cold prior to processing to syrup has advantages over canning the fruit or processing it immediately after picking. Experiments both on a laboratory scale and on a large scale show that the "cold-process" method has no unfavourable effect on vitamin C retention in the finished product.

2019. Rodahl, K. 577.16: 551.566.3
Content of vitamin C (l-ascorbic acid) in arctic plants.
Trans. bot. Soc. Edinb., 1944, **34**: 205-10, bibl. 2.
Under the auspices of Oslo University the vitamin C content of a large number of common arctic plants, including the seasonal variations in some of them, was determined in the region of Revet, Clavering Island, N.E. Greenland. The tabulated results show higher values for plants growing in N.E. Greenland than those obtained for the same species in S.E. Greenland. The ascorbic acid content of the indigenous flora is reported to be so high that Europeans are not dependent on the supply of foodstuffs from Europe.

2020. Johnson, L. P. V., Young, G. A., and Marshall, J. B. 577.16: 581.142
A note on the production of vitamin C by sprouting seeds.
Sci. Agric., 1945, **25**: 499-503, bibl. 6, being *Pap. Div. appl. Biol. nat. Res. Lab. Canada* **1247**.
In a search for seeds which will yield relatively large quantities of vitamin C on sprouting it was found that the field pea varieties Early Blue (Ottawa No. 21), O.A.C. No. 181 and Arthur rank high among readily available kinds. The Chinese Salad bean and the English Windsor broad bean proved superior as a source of vitamin, but they are not sufficiently common in Canada to justify their recommendation for large-scale production. Tabulated data are presented which indicate the vitamin C production of a number of seed kinds and varieties at different temperatures and show the number of days required for maximum yield (5 in the case of peas). The optimum temperature for germination was 15-22° C., good drainage and aeration of the material being important.

2021. Andreae, W. A., Chalmers, E. A., and McFarlane, W. D. 613.2: 581.142
Legume and cereal sprouts as a dietary substitute for fresh vegetables.
Sci. Agric., 1945, **25**: 504-23, bibl. 14, being *J. Ser. Macdonald Coll.* **198**.
Methods are described of sprouting cereal and legume seeds in bulk to obtain a maximum yield of vitamin C, and suggestions are made for the conversion of these sprouted seeds into palatable dishes.

2022. Slepyh, D. A. 635.1/7: 577.16
Vitamin C in fresh vegetables. [Russian.]
Ovoščevodstvo (Vegetable growing), 1940, No. 4, pp. 38-9.
The vitamin C content of the vegetables commonly grown in the U.S.S.R. is discussed with special reference to its distribution within the plants and the stage of maturity of the organs concerned.

2023. Colker, D. A., and Eskew, R. K. 635.1/7: 631.57
Processing vegetable wastes for high-protein, high-vitamin leaf meals.
Fruit Prod. J., 1945, **24**: 302-9, 317, bibl. 4, being *Circ. Bur. agric. industr. Chem.* **AIC-76**.
The engineering factors involved in processing wastes of beets, broccoli, carrots, kale, lima beans, peas and spinach are discussed.

2024. Pollard, A., Kieser, M. E., and Steadman, J. 635.64: 581.163: 613.2
The nutritional value of parthenocarpic tomatoes.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 179-84.
Examination of tomato fruits produced parthenocarpically and of fruits produced by normal pollination at the same time under identical greenhouse conditions showed that the ascorbic acid level varied from plant to plant within each treatment, but that a greater variation existed between trusses on the same plant, the ascorbic acid content being greater in the higher than in the lower trusses. Where particularly high concentrations of chemical agents had been used to induce fruit formation the ascorbic acid was lower, otherwise there was no significant difference between parthenocarpic and normally pollinated fruits. The parthenocarpic fruits were sweeter and somewhat insipid in taste, presumably owing to the fact that their sugar content was higher, whereas their titratable acid was about the same as in normal fruits. There was no difference in total solids.

2025. Jacoby, F. C., and Wokes, F. 577.16: 635.937.34
Carotene and lycopene in rose hips and other fruits.
Biochem. J., 1944, **38**: 279-82, bibl. 14.
A method is described for extracting, separating, and estimating carotene and lycopene from plant materials, which minimizes isomerization and oxidative changes. Applied to the flesh of ripe rose hips, this method showed carotene contents of 41-671 μg/g. and lycopene contents of 94-834 μg/g. in 26 distinct species and hybrids. The method also gave satisfactory results with dried rose hip extracts, *Solanum dulcamara* berries, tomatoes and other sources of carotenoids. [From authors' summary.]

2026. VINSON, L. J., AND OTHERS. 632.48: 613.2
The nutritive value of *Fusaria*.
Science, 1945, **101**: 388-9, bibl. 10.
It was found that *Fusarium lini*, which can be easily grown in the course of alcoholic fermentation, is a good source of vitamins of the B-complex and that its food value compares very favourably with that of brewer's yeast.—Fordham University.

2027. DITTMANN, G. 635.655: 613.2
Der Wert unreifer Sojabohnen für die menschliche Ernährung. **(Unripe soya beans of value for human nutrition.)**
Dtsch. Molkerei-u. Fettwirtsch., 1943, No. 35, from abstract *Forschungsdienst*, 1944, **17**: 332-3.
In unfavourable seasons soya beans will not fully ripen in Germany. In order to determine the nutritional value of unripe soya beans, beans of the early variety Reichszüchtung 71 were picked 3-4 weeks before the proper harvesting time and were boiled for 100 minutes. The product was excellent, but picking and shelling of the unripe pods was a lengthy business. Trials, which are under way, will show whether unripe soya beans can be threshed out after being dried in barns. Data on the composition of air-dried, green-ripe soya beans include the following figures: Raw protein (N×6·25), 42·8%; crude fat (ether extraction), 15·7%; ash, 4·7%; caloric value per 100 g., 388 Cal. In this connexion it may be interesting to note that, according to the abstract in *Forschungsdienst*, in Bulgaria experiments on the production of soya milk, carried out by Bekjarow, have been successfully concluded. The beans are soaked in water and the pulp is pressed through a screen. The resulting milk is reported to contain 35-50% protein, 5-18% fat and 0·8% nutrient salts. Sugar has to be added. It is planned to use these results on an industrial scale.

2028. SMITH, M. C., AND CALDWELL, E. 577.16
The effect of maceration of foods upon their ascorbic acid values.
Science, 1945, **101**: 308-9, bibl. 3.
The data in this paper indicate that the conversion of reduced ascorbic acid to the reversibly oxidized form proceeds so rapidly in some foods under many different conditions of sampling, holding, and preparation for consumption, and is frequently of such magnitude that the usual method of assay of the reduced form *only* is an inadequate measure of the true vitamin C values. [From authors' summary.]—Arizona Agricultural Experiment Station.

2029. ANON. 577.16: 663.25
Food yeast: its production and nutritive value.
Crown Colon., 1945, **15**: 312.
A new industry for sugar-growing Colonies and the story of its development. Half a ton of living yeast, the approximate live weight of a bullock, is reported to produce 2,048 tons of fresh yeast in 24 hours or 245 tons of high-grade protein plus large amounts of water-soluble B vitamins. Ways of adding food yeast to the diet have been devised. A plant for yeast production has been erected in Jamaica, designed to yield 12 tons daily.

2030. GRISWOLD, R. M. 664.85.23.036
Color and palatability of home-canned cherries.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 330-4, bibl. 2.
A study of the changes in quality in Montmorency cherries canned at home or by commercial canners led to recommendations for home-canning which include the following points: (1) Use cherries as soon after picking as possible and soak the fruit for 3 hours in cold running water (or wash, if inconvenient) before pitting, (2) put jars in boiling water for at least 20 minutes, fill with pitted cherries and pour boiling sugar syrup (40-45%) over the fruit to a level ¼ in. from the top, (3) the water, in which the jars are processed for 25 minutes after boiling has resumed, should extend 1-2 in. above the top of the jars, (4) maintain a low storage temperature.

2031. BONNEY, V. B., AND FISCHBACH, H. 635.656: 581.192
Comparative chemical studies on pea seed and canned soaked dry peas.
J. Ass. off. agric. Chem. Wash., 1945, **28**: 409-17, bibl. 5.
(1) No determinable invert sugar was found in the pea seed. (2) All seed contained from 4·7% to 10·2% of sucrose. (3) Appreciable amounts of the sugar, ash, and crude dextrin of the dry peas were leached out prior to canning, i.e. in the soaking and blanching phases. (4) The drained liquor of the canned peas contained appreciable amounts of ash, protein, and sugar—more sugar than the drained peas. (5) The pectic acid content of the drained canned peas was not sufficiently different, among the varieties examined, to furnish a valuable objective test for varietal discrimination. (6) Alcohol-insoluble solids, and ratio of crude starch to protein, were much higher in the Alaska peas than in any of the sweet, wrinkled varieties. [Authors' summary.]

2032. NEWCOMBE, B., AND ALDERMAN, D. C. 664.84.13.047
Factors influencing quality of dehydrated carrots.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 341-5.
Although there was no difference in quality in the fresh state, dehydrated Red-cored Chantenay carrots from a variety of mineral or upland types of soil proved in every case superior to those grown on muck soils. After 2 and 4 months' storage in an atmosphere of carbon dioxide at room temperature the muck soil product possessed a decided off-flavour, while the upland-grown carrots kept well. It was found that the white flakiness on the outside surface of dried cubes can be avoided by substituting lye-peeling for the standard method of abrasive peeling. Vitamin A loss in dehydrated carrots did not exceed 10·7%. Four new recipes for dehydrated carrot products have been developed.

2033. GUÉRIN, B. 664.84.047
Sur l'aptitude à la cuisson des légumes secs. **(Cooking tests of dried vegetables.)**
Ann. agron. Paris, 1940, **10**: 270-86, bibl. 1.
An apparatus for testing the resistance to crushing of dried vegetables is described. The subjects discussed include: Variations of the resistance to crushing in relation to time of cooking, hydration and previous soaking; methods of cooking; coefficient of membrane permeability; mean internal resistance; behaviour of samples of different origin; influence of age and method of drying; influence of calcium salts in the water used for cooking and soaking. The vegetables examined in these tests were bean varieties.

2034. KESSLER, H. 664.85.047
Verbesserungen auf dem Gebiet der Dörrofen-Konstruktion. **(Improvements in the construction of kilns for fruit drying.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 116-8.
Improvements in the construction of the heating system of a kiln for fruit drying produced by a Swiss firm, are described and diagrammatically illustrated.

2035. CRUESS, W. V. 664.85.047
New uses for dried fruit.
Fruit Prod. J., 1945, **24**: 324-6, 345.
In this paper, presented at the Dried Fruit Conference, Modesto, Calif., May 1945, new uses of dried fruits are suggested as an outlet for the anticipated surplus in the post-war era. The suggestions include the use of dried fruit in candy, for eating out of hand and in breakfast cereals.

2036. RUSHTON, E., STANLEY, E. C., AND SCOTT, A. W. 664.84.047
Compressed dehydrated vegetable blocks. The application of high frequency heating.
Chem. Industr., 1945, No. 35, pp. 274-6.
The method described consists briefly of the application of high frequency current to pressed cabbage blocks in a vacuum. In this way the moisture content of a cabbage block was reduced from 9% to below 4% within an hour without heat damage to the material.—National Physical Laboratory.

2037. FRIAR, H. F., AND VAN HOLTEN, P. 664.84.047
Effect of sulfiting on maximum drying temperature of vegetables.
Fruit Prod. J., 1945, **24**: 337-9.
The tabulated results show that sulphiting makes it safe to raise the drying temperature with cabbage and onions to 155° F. and with potatoes to 165° F.

2038. MOYER, J. C., AND STOTZ, E. 664.84
The electronic blanching of vegetables.
Science, 1945, **102**: 68-9, bibl. 1, being *J. Pap. N. York St. agric. Exp. Stat.* **637**.
In preliminary experiments the substitution of steam blanching by electronic blanching was found to reduce ascorbic acid losses in cabbage from 32% to 3%. Shredded cabbage—slices $\frac{1}{8}$ in. thick—was tightly packed in cartons commonly used in the freezing of vegetables and placed between two copper electrodes mounted in an electric air oven. Tuning stubs were attached to the electrodes to eliminate standing waves and assist in coupling the load to the oscillator, having an output of 750 watts at a frequency of 150 megacycles. A heating period of 2-3 minutes was sufficient to ensure a negative catalase test, the oven temperature being 100° C. More extensive studies including other vegetables and storage trials are in progress.

2039. SCHMID, G. 663.25
Eine lehrreiche Weindegustation. **(An instructive wine test.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 176-7.
A wine-tasting test showed that the vintage methods practised at Wädenswil are capable of improving the quality of wines considerably. Briefly, these methods consist of repeated pickings, leaving the healthy grapes as long as possible on the vines. Grapes fully ripe and with the noble rot developed on them will yield superior wines if pressed immediately, provided their further preparation is given special care.

2040. WILLIAMS, J. L., AND KUCHEL, R. H. 663.25
The use of burnt gypsum (builder's plaster) in wine making.
J. Dep. Agric. S. Aust., 1945, **48**: 352-4.
Builder's plaster (burnt gypsum) at the rate of 2-4 lb./ton grapes is very effective in reducing the wine pH. It offers a simple and effective method of providing immunity from spoilage organisms and makes the use of large doses of sulphur dioxide unnecessary. Although the wines treated with plaster are at first coarse, this trait disappears in storage and at 9-12 months they are clean on the palate. Plastered wines mature more rapidly than heavily sulphured wines. [From authors' summary.]

2041. OSTERWALDER, A. 663.39
Hefefäulnis ? Hefezersetzung ? **(Decomposition of yeasts by bacteria in fruit wines ?)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 199-202.
No, but the gradual dying off of the yeast renders the drawing off of fruit wines from the yeast necessary, in warm cellars sooner than in cool cellars.

2042. ENGSTEDT, G. 663.813
Förberedande försök med musterimaskiner. **(Preliminary trials with fruit juice extraction equipment.)**
Fruktodlaren, 1943, No. 3, pp. 90-2.
Trials with fruit presses carried out in Sweden at the State Institute for Equipment Testing show that the application of a pressure of 4 kg. per square centimetre will yield not more than about half of the total juice, while a pressure of 15-20 kg. will result in economic exploitation of the material. A high initial pressure was found to be favourable. It was further demonstrated that practically all the juice is extracted after a treatment of 10 minutes, i.e. a saving of one-half or two-thirds of the time for which pressure is commonly applied in commercial plants. Finely ground material proved to yield 4-10% more than coarser material.

2043. LÜTHI, H. 663.813: 577.16
Zur Frage des Vitamin-C-Gehaltes in Fruchtsäften, insbesondere in Süssmosten. **(Vitamin C retention in fruit juices, especially when processed.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 379-88, bibl. 21.
In this survey of the literature the following conclusions are reached: (1) The vitamin C content of fresh press juice is almost equal to that of whole fruits and berries. (2) Little vitamin C is lost in the preservation process, irrespective of the method employed. (3) There is a difference of opinion on the effect of sulphurous acid upon vitamin C retention. More recent trials tend to show, however, that sulphurous acid is not so injurious as was thought earlier. (4) In storage, the vitamin C disappears in a relatively short time, the most rapid loss occurring apparently during the first weeks. In closed vessels or vessels covered with CO_2 the loss is slower than in open vessels. (5) Experiments on animals have proved that the vitamin C content of commercial apple and grape juices is practically nil.

2044. SCHWILCH, W. 663.813
So macht man Süssmost. Kurzgefasste Anleitung für die Herstellung von Süssmost, Trauben- und Beerensaft. . . . **(The processing of fruit juice. A short introduction.)**
From review *Schweiz. Z. Obst-u. Weinb.*, 1945, **54**: 386.
Within 4 years of its first publication a 5th enlarged edition has appeared of this brief introduction into the processing at home of fruit and grape juices by the heat method.

2045. HARTMANN, A. 663.813
Der gegenwärtige Stand der bäuerlichen oder häuslichen Süssmostherstellung in der Schweiz. **(A census of fruit juice production on Swiss peasant farms.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 225-9.
The census was attempted early in 1945 following the largest fruit crop in human memory.

2046. LÜTHI, H. 663.813
Über zwei Ursachen der Verschimmelung von Süssmosten im Kleinbetrieb. **(Two sources of mouldiness in fruit and grape juices processed on a small scale.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 315-8.
(1) The ordinary methods of sterilizing barrels used on farms have proved insufficient to prevent the development of moulds in non-alcoholic fruit and grape juices. (2) Storage in bottles has also not given reliable results. In this case the humidity of the cellar, which affects the properties of the filter, was found to be responsible for mould infections. The trials are being continued at Wädenswil Experiment Station.

2047. FORGACS, J. 663.813: 634.11
Chemical and microbiological examination of canned apple juices.*
Ill. Hort., 1944, Vol. **33**, No. 4, 2 pp.
According to the results obtained, an anaerobic growth may be, at least in part, responsible for clouding of apple juice.

* For Canadian work on apple juice, see 1409.

2048. (Clifcorn, L. E.) 663.813: 634.31
Experiments on canning of orange juice.
Fruit Prod. J., 1945, **24**: 342.
A summary of recommendations made by the research department of a commercial canning firm for improving the quality of canned orange juice.

2049. Anon. 016: 633.85+634.6
Bibliographie des matières grasses. Les huiles de palme et d'amandes de palme. Le ricin. Chimie générale des corps gras. L'huile d'arachide. Méthodes de traitement pour l'extraction, la décoloration et le raffinage de l'huile de palme. **(Bibliography on oil production.)***
Bull. Mat. grass., 1943, **27**: 6, bibl. pp. 1-8 (palm kernel oil), **27**: 7, bibl. pp. 9-16 (castor oil), **27**: 8, bibl. pp. 17-24 (castor oil), **27**: 9, bibl. pp. 25-30 (castor oil), **27**: 9, bibl. pp. 31-2 (chemistry of fats), **27**: 10: 175-84 (processing of palm oil), **27**: 10, bibl. pp. 33-6 (chemistry of fats); 1944, **28**: 2, bibl. pp. 37-41 (processing of palm oil), **28**: 2, bibl. pp. 42-4 (chemistry of fats), **28**: 3, bibl. pp. 45-8 (ground nut oil), **28**: 4, bibl. pp. 49-52 (ground nut oil), **28**: 5, bibl. pp. 53-6 (ground nut oil), **28**: 9/10, bibl. pp. 57-60 (processing of palm oil).
Attention is drawn to these extensive bibliographies of oil production and processing produced under the auspices of the new institute. In all cases but one cited here the pages devoted to the lists are numbered separately at the end of each part.

2050. Islip, H. T. 633.85
Essential oils: potentialities of a minor industry.
Crown Colon., 1945, **15**: 637-40, 623-5.
Although the Colonial Empire's contribution to the total production of essential oils (about 10,000 tons per annum) is not large, a large proportion of the world's supplies of citronella, lime and patchouli oil come from colonial sources. The illustrated article reviews the position of the essential oil industry in the following territories: The British West Indies, Malaya, Ceylon, Seychelles, Kenya, Palestine, British Guiana, Gold Coast, Tanganyika, figures for the exports of essential oils from the principal producing countries being tabulated.

2051. Bray, G. T. 633.854
Some Empire vegetable drying oils.
Chem. Industr., 1945, No. 37, pp. 293-4.
The oils treated in this abstract of a lecture delivered before the London and South-Eastern Counties Section, Royal Institute of Chemistry, in April 1945, by the Vice-Principal, Plant and Animal Products Department, Imperial Institute, are: Linseed, China wood or tung, perilla, *Oiticica*, candlenut, castor, po-yok and isano.

2052. B[ray], G. T.
Isano oil.
Bull. imp. Inst. Lond., 1944, **42**: 250-3, bibl. 19.
A résumé of the information on isano (*Ongokea kleineana*) oil, products of which are claimed to have good paint and varnish properties. The cake has a high nutritive value, but feeding trials are necessary before it can be recommended as a feeding stuff.

2053. Bray, G. T., and Major, F. 633.85-1.531
Sunflower seed from Nigeria.
Bull. imp. Inst. Lond., 1945, **43**: 83-6.
An experimental crop of sunflowers, grown by the Agricultural Department of Nigeria in 1943, has given excellent results and further trials have been made in other parts of the Colony. The results of examinations of grey and black seeds, their respective oils and residual meals are tabulated. The removal of the husk by means of a decorticating machine previous to oil extraction is recommended.

* See also 1951, 1984.

2054. Flanzy, M., and Reingpach, J. 634.8: 633.85
Recherches sur l'utilisation des pépins de raisin comme source d'huile. **(Grape pips as a source of oil.)**
Ann. agron., Paris, 1943, **13**: 60-71.
Percentage of oil extracted. The finer the fragments into which grape pips are crushed before extraction, the more complete will be the extraction. A very high degree of fineness allows the extraction of almost all the oil. Extraction, however, in such a case takes a long time unless the particles are continually stirred in the solvent or extractors are used. *Effect of humidity of pips on oil extraction.* The humidity of the pips optimum for greatest oil production is about 20%. *Storage of pips.* Ensilage several inches thick at a humidity of about 50% using layers of grapes skin, etc., to exclude air offers the best method of storage, but should not continue for more than 5 or 6 months.

2055. Gonzalez Gomex, C., and Perello Barcelo, J. M. 633.526.29
Datos de un acíbar español. Su comparación con los comerciales. **(Spanish aloes-juice, its comparison with those in commerce.)**
Farmacognosia Anal. Madrid, 1942, **1**: 127-49.
Extracts from the leaves of *Aloe vulgaris* from Malaga contained about half as much anthraquinone derivatives as those of plants from the Cape.

2056. Suter, A. F. 633.94(41/42)
Natural resins of the British Empire.
Crown Colon., 1945, **15**: 711.
This brief survey comes to the conclusion that copals and damars deserve more attention and that, given sufficient facilities for research, there is ample room for an expansion of the natural resin industry alongside the development of synthetic resins.

2057. Joachim, A. W. R., and Panditteseker, D. G. 633.682: 581.192
Investigations of the hydrocyanic acid content of manioc (*Manihot utilissima*).
Trop. Agriculturist, 1944, **100**: 150-63, bibl. 5.
Analytical and sampling methods and the effects of treatment and storage on the hydrocyanic acid content of manioc are discussed in detail. The hydrocyanic acid content of manioc leaves and its reduction by treatment are briefly dealt with.

2058. Child, R., and Nathanael, W. R. N. 658.8
Ceylon estate copra. Part II. No. 2 and No. 3 grades of copra.*
Trop. Agriculturist, 1943, **99**: 203-6, bibl. 2.
1. Analyses are reported on 24 samples of No. 2 copra, and 24 samples of No. 3 copra, received at regular intervals over a period of a year from four estates. 2. The results indicate that the samples contain on the average slightly higher oil percentages than Estate No. 1 copra, and that the acidities of the oils are not unduly high. Their physical nature is the only objection to their use for milling, and their greater tendency to deterioration by moulds, an objection to their overseas shipment. [Authors' summary.]

2059.
a Bartholomew, E. T., and Sinclair, W. B. 633.85: 634.3
Apparatus for the determination of volatile citrus oils.
J. Ass. off. agric. Chem. Wash., 1945, **28**: 339-45, bibl. 4, being *Pap. Citrus Exp. Stat. Riverside* **526**.

* For Part I, dealing with No. 1 grade of copra, see *ibidem* 88: 137-49; *H.A.*, 7: 775.

b BULLIS, D. E., AND ALDERTON, G. 633.79: 581.192
A new approach to the estimation of hop soft resins.
Commun. Wallerstein Labs., 1945, **8**: 119-27, bibl. 6, being *tech. Pap. Ore. agric. Exp. Stat.* **456**.

c CHARAVANAPAVAN, C. 633.682 + 635.653
Studies in manioc and lima-beans with special reference to their utilization as harmless food.
Trop. Agriculturist, 1944, **100**: 164-8, bibl. 7.

d CRANG, A., AND CROXALL, M. 663.813: 634.11
Notes on domestic apple juice production.
A.R. Long Ashton agric. hort. Res. Stat. for 1944, 1945, pp. 208-10, bibl. 3.

e DAY, H. G., AND LEVIN, E. 633.85
The nutritional value of sunflower seed meal.
Science, 1945, **101**: 438-9, bibl. 4.

f FULTON, C. O., AND METCALFE, B. 582.73: 664.8
Preparation of Irish moss (*Chondrus crispus*) extracts for use as a jelling and stabilizing agent in foods.
Canad. J. Res., 1945, **23**, Sec. F, pp. 273-85, bibl. 9.

g GARRARD, E. H., TRUSCOTT, J. H. L., AND CONNER, J. W. 664.84.036.5: 632.3
The bacterial flora of low-acid vegetables canned at 212° F. I. A preliminary study of the effects of various processing procedures.
Canad. J. Res., 1945, **23**, Sec. F, pp. 231-8, bibl. 4.

h GREENHILL, W. L. 633.52-1.576
Flax processing: the need for research.
J. Coun. sci. industr. Res. Aust., 1945, **18**: 132-41.

i GRINDLEY, D. N. 633.85
Investigation of the seed oils of some Sudan *Mimosaceae*.
J. Soc. chem. Ind. Lond., 1945, **64**: 147, bibl. 5.

j GRISWOLD, R. M. 634.11: 613.2
Color and palatability of cooked Jonathan apples.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **27**: 60-2, bibl. 5.

k HOPKINS, R. H. 663.41
Vitamins in top fermentation brewing materials and beer.
Commun. Wallerstein Labs, 1945, **8**: 110-8, bibl. 18.

l LAMPITT, L. H., AND CLAYSON, D. H. F. 577.16
The nature of ascorbic acid oxidase. (1) A critique of the copper-protein theory.
Biochem. J., 1945, Vol. **39**, p. xv, bibl. 3.

m LAMPITT, L. H., CLAYSON, D. H. F., AND BARNES, E. M. 577.16
The nature of ascorbic acid oxidase. (2) The reactions between ionized copper, potassium phosphate and calcium phosphate.
Biochem. J., 1945, Vol. **39**, p. xvi, bibl. 2.

n LUCAS, E. H., AND BAILEY, D. L. 664.84.047 + 664.85.047
A simple, rapid, quantitative method of assaying peroxidase activity in dehydrated vegetables and fruits.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **26**: 313-9, bibl. 9.

o LÜTHI, H. 663.813
Der umstrittene Untenanstich an Süssmostflaschen. **(The practice of bottom tapping fruit juice containers.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 264-6.

p LÜTHI, H. 663.39
Die Gärführung und Behandlung der Obstweine im Kleinbetrieb. **(The treatment and method of fermentation employed in the small-scale production of fruit wines.)**
Huber & Co. AG., Frauenfeld, 1945 (?), pp. 64, Fr. 3.20, from review *Schweiz. Z. Obst-u. Weinb.*, 1945, **54**: 386.

q LÜTHI, H. 663.39
Zur Gärführung in den Obstweinkeltereien. **(The method of fermentation employed in the preparation of fruit wines.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 343-7.

r LÜTHI, H. 663.25
Anwendung und Vermehrung der Reinhefe. **(The application and multiplication of pure yeasts in wine production.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 321-7, being *Flugschr. Wädenswil Versuchsanst. Obst-, Wein-u. Gartenb.* **12**.

s MCKENZIE, H. A. 535.33: 664.8
Spectrography in food research.
Food Pres. Quart., 1944, **4**: 4: 10-2.

t MAPSON, L. W. 577.16
Determination of ascorbic acid in presence of interfering substances by the "continuous-flow" method. 1. Preliminary tests. 2. Tests with dehydrated vegetables, and with various raw and cooked fruits and vegetables.
Biochem. J., 1945, Vol. **38**, pp. xxiv-v, bibl. 2.

u MARSHALL, R. E. 613.2: 634 + 635
Relative nutritive-unit cost values of some fruits and vegetables.
Quart. Bull. Mich. agric. Exp. Stat., 1944, **27**: 128-30.

v NANJI, H. R., SAVUR, G. R., AND SREENIVASAN, A. 635.977.8: 631.563.5
Tamarind seed 'pectin'.
Curr. Sci., 1945, **14**: 129-30, bibl. 10.

w OSTERWALDER, A. 663.25
Weitere Beiträge zur Kenntnis des Braunwerdens der Weine. Mitteilung aus der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. **(The browning of wines. Communication from the Swiss Horticultural Experiment Station at Wädenswil.)** [French summary pp. 2.]
Landw. Jb. Schweiz., 1945, **59**: 573-605.

x PERRONNE, —., BRICHET, J., AND CANTEGRELLE, —. 664.84 + 664.85.8 + 664.84.64
Le séchage familial des légumes frais et des raisins. Conserves familiales de tomates. **(Home-drying of fresh vegetables and grapes. Home-preservation recipes for tomatoes.)**
Bull. Inspect. gén. Agric. algér. **101**, 1944, pp. 18.

y P[EYER], E. 663.813
Die Anwendung der Oechsle-Waage zur Bestimmung der Qualität der Traubensäfte. **(The application of the Oechsle balance for determining the quality of grape juices.)**
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 365-6.

z PEYER, E., AND HUBER, H. 663.25
Weinlese und Verarbeitung der Trauben. **(Vintage and wine making in Switzerland.)**
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 327-34, being *Flugschr. Wädenswil Versuchsanst. Obst-, Wein-u. Gartenb.* **51**.

2060.

a REIFER, J., AND MANGAN, J. L. 664.8.047: 581.192
A rapid determination of sulphur dioxide in dehydrated foods.
N.Z. J. Sci. Tech., 1945, **27**, Sec. A, pp. 57-64, bibl. 5.

b RENTSCHLER, H. 663.82
Die Beeinflussung der Farbe von Rotweinen durch das Einbrennen. (**The effect of potassium metasulphite treatment on the colour of red wines and fruit wines.**)
Schweiz. Z. Obst-u. Weinb., 1945, **54**: 259-61.

c RUBIN, S. H., JAHNS, F. W., AND BAUERNFEIND, J. C. 664.85: 577.16
Determination of vitamin C [in] fruit products.
Fruit Prod. J., 1945, **24**: 327-30, 344, 350, bibl. 7.

d SABALITSCHKA, T., AND PRIEM, A. 664.84.047: 577
Zur Bestimmung von Vitamin C. I Mitt. : Unbrauchbarkeit der Vitamin-C-Bestimmung mit Methylenblau für Trockengemüse. (**The determination of Vitamin C. Comm. I: Methylene blue valueless for vitamin C determinations in dried vegetables.**)
Z. physiol. Chem. Berlin, 1941, **270**: 194-200, from abstract *Forschungsdienst*, 1944, Vol. **17**, abstr. p. 24.
The values obtained are too low.

e SUGIHARA, J., AND CRUESS, W. V. 635.262: 581.192
Observations on the oxidase of garlic.
Fruit Prod. J., 1945, **24**: 297-8, bibl. 9.

f WIDMER, A. 663.25 + 663.39
Klärung der Weine und Obstweine. (**Clarifying wines and fruit wines.**)
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 411-7, being *Flugschr. Wädenswil Versuchsanst. Obst-, Wein-u. Gartenb.* **20**.

g WIDMER, A. 663.25
Das Braunwerden der Weine und die Behandlung von zum Braunwerden neigenden und braunen Weinen. (**The browning of wines and the treatment of wines showing a tendency to browning and of brown wines.**)
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 459-64.

h WIDMER, A. 663.39
Die Bedeutung der schwefligen Säure in der Kellerpraxis. (**The significance of sulphurous acid in the preparation of fruit wines.**)
Schweiz. Z. Obst-u. Weinb., 1945, **53**: 334-7.

i WIDMER, A. 663.39
So macht man gesunden und fehlerfreien Obstwein. (**How to make a good fruit wine.**)
Schweiz. Z. Obst-u. Weinb., 1944, **53**: 331-3.
Information from the Swiss Horticultural Research Station, Wädenswil.

NOTES ON BOOKS AND REPORTS.

2061. BAGENAL, N. B. (Editor). 634.1/8(42)
Fruit growing, modern cultural methods.
Ward Lock & Co., London, revised edition 1945, pp. 416, 30s.

The first edition of this book was reviewed in detail in 1939, *H.A.*, 9: 1511, and the appearance of a second edition is well timed to meet a demand from students, instructors and prospective fruitgrowers for a vade-mecum upon this important section of horticulture. The author's unique experience in the field of research and advisory work has made him a recognized authority on the subject of fruit growing and there can be few people so well qualified to present the findings of recent research in readable form to practical horticulturists.

The addition of a special chapter on pruning summarizes clearly modern thought upon this difficult art. Detailed recommendations are made for pruning apples and pears in all stages of growth. The chapter on the control of pests and diseases has been thoroughly revised and brought up to date. It now includes particularly valuable diagnosis tables of pest and disease damage and ends with a three-page Guide to Spraying.

The lists of fruit varieties classified according to their suitability for different purposes have also been revised. New entrants to commercial fruitgrowing should study General Considerations (Chapter I) and Planning and Planting (Chapter VIII), where careful forethought will pay a high dividend.

There are one or two errors which should be corrected in future impressions: a wrong caption on Fig. 10, p. 83 " top " instead of " bottom ", the table on p. 64 omits cherries and fails to clarify the pruning of red and black currants. (Might one suggest that the pruning of black currants immediately after fruiting, when seasonal work allows, is well worth a trial ?). On p. 303 the season of Laxton's Superb pear is given as October—surely late August would be nearer the mark ?—and some might find evidence to doubt the description of Barnack Beauty as a shy cropper, p. 177. Special mention should be made of the illustrations which include eight colour plates and sixty photographs and set a high standard.

The type makes easy reading, the binding is sound and serviceable, and the book lies flat when opened. Mr. Bagenal has given practical horticulturists a sound work of reference, skilfully marshalling proven facts and sound practical points to the benefit of instructors and students alike. Perhaps a list of references to Ministry publications and other relevant literature might appropriately and usefully complete the picture in future editions.

Moreover, it is to be hoped that he will not rest here, but will consider a manual of pomology, comparable to the American works, which this country so seriously lacks.

A.P.P.

2062. BENNETT, E. H. (Editor). 03: 54
The chemical formulary. Vol. VII.
Chemical Publishing Co., Inc., Brooklyn, N.Y., 1945, pp. 474, $6.00.

The innumerable objects, for the composition of which formulas are given here, make it hard to realize that this is the seventh of a series of similar volumes in which, surely, the formulas wanted by all the earnest-minded potterers in the world must be contained. In this volume the horticulturist will certainly find the section devoted to Farm and Garden Specialities interesting and of considerable reference value. The housewife will find the following sections valuable. Flavours and Beverages; Cosmetics and Drug Products; Food Products; Inks and Marking Substances.

2063. BRIMBLE, L. J. F. 581.9(42)
Flowers in Britain.
Macmillan & Co., London, 1945, reprinted, pp. 393, 12s. 6d.

A misunderstanding of the title " Flowers in Britain " combined with a spot of wishful thinking led to the hope that here at last was the long awaited, popular yet up-to-date and authoritative work on British wild flowers, often promised by various competent persons but, so far, unproduced. Actually there is no real deception. Flowers in

Britain here means, logically enough, flowers that grow in Britain even if they require a hot-house to make them do it—a comprehensive interpretation of his title that enables the author to include a good proportion of the tropical flora, not omitting cocoa, coconuts and bananas ! However, to be fair, it must be recorded that where possible the British flora has first place.

The plan of the book is to take each natural order in turn (following the system of classification of Hutchinson's Families of flowering plants) and under the heading Wild Plants to discuss points of interest concerning the more important members of the order native to Britain, adding in many cases a note on folklore and an apposite verse or two culled from a major or minor poet. From the native plant the discussion turns, usually without poetic accompaniment, to its garden or exotic relatives, and thence to any economic plants, native or foreign, that the order may contain. Should there be no British species represented in the order, it is not as a rule omitted but its more notable exotic members are given a brief mention. Because the book is mainly written for those without any great botanical knowledge, a useful outline of the structure of flowering plants and the functions of their various organs is provided in the opening chapters. In this section more freely, and at all too rare intervals throughout the remainder of the book, the author provides a number of beautifully drawn explanatory figures from his own pen.

It is made clear in the introduction that the book is not intended to be a highly scientific treatise. If this be borne in mind it should provide interest and profit to all readers, not excluding those pure or academic botanists whose mental lacunae on the more utilitarian aspects of their science so often stagger the ordinary gardener. The information imparted in these pages may appear somewhat " scrambled " in the sense that it follows no fixed course, but it is never dull and the illustrations which, besides the author's own, include 18 coloured plates and many photographs, add greatly to the interest. The book is well indexed and admirably produced.

A word of praise should be given to the dust jacket. Its colourful composition of the English scene, blue sea, white cliffs, meandering stream and foreground of nearly all the known spring flowers cannot fail to induce an acute nostalgia in every exile from the land at home or abroad.

G. St. Cl. F.

2064. Bush, R. 632.111: 634.1/7

Frost and the fruitgrower.

Cassell & Co., London, 1945, pp. 119, 10s. 6d.

Few people sufficiently interested in fruitgrowing to scan even occasionally its more popular literature can have failed to encounter Bushiana in one form or another. Signed or anonymous, the touch is unmistakeable. The gay and often witty presentation of the amalgam of practical common sense, scientific facts and intuition which compose a Bush production is its own trade mark. It is necessary (or unnecessary) to add that this welding of fact and intuition is sometimes rather too close to suit some of our sourer critics. In his latest work, " Frost and the fruitgrower ", Mr. Bush fully maintains his reputation for presenting his data, scientific or not so scientific, in a thoroughly readable form. His purpose, well achieved, is to tell all about the killing spring frosts which in some seasons devastate our orchards, why they occur, why one site may be frosted and another, perhaps only a few yards away, escapes, how to site a new orchard so as to reduce frost risks to a minimum and much else besides. But he cannot tell—and neither, it seems, can anyone else—how to save the crops of the indifferently sited orchards which predominate, and always must do, since the best fruit soils are largely to be found in broad valleys and plains subject to both radiation and wind frosts. For good or ill, the lie of the land is of the first importance in determining whether the cold air on a frosty night is to drain safely away, or, unable to do so, is to bu ld itself up in deep pools to tree-top height and over with subsequent disaster to the blossom or fruitlets. The behaviour of cold air in various circumstances forms the main theme and is never lost sight of throughout the book, and much attention is paid to the intelligent planting of slopes to allow of satisfactory air drainage. The braking action of too close planting on the rapid passage of cold air is a theory very dear to the author and he does not fail to urge its validity. Similarly, he cites interesting examples of the dangerous build-up of cold air that can result from such seemingly minor obstacles as a wall or hedge across the path of flow. Orchard heating is discussed but without any great enthusiasm for its possibilities in England on a large scale, though in small orchards which cannot be otherwise treated, for instance those bounded by the woodland of an uncooperative neighbour, the use of 60 or more heaters to the acre might be worth while. Mr. Bush toys with the idea of a barrage of heaters built across the point of entry in cases where the orchard is a recipient of cold air from shallow upper slopes, but experiments successful in one year failed in the next and he still preserves an open mind. Some American methods of frost prevention are briefly touched on.* The effects of frost on the fruit, indications of frost damage and varietal susceptibility provide two useful chapters. The book has a number of photographs well chosen to illustrate and support the author's theories, and on plate 21 it is pleasant to observe that " the grandchild " has once more successfully gate-crashed, this time in the guise of an expert on " frost-eye ", which we fancy is something she never receives from " granpa ". The book has vision and imagination, and can be read with pleasure by growers and laymen alike. It is a pity no authorities are quoted directly, as a statement with a scientific experiment for backing carries more weight than a surmise which may turn out to be an hallucination. Often the reader would like to be able to assess probabilities by distinguishing the one from the other. If not presumptuous, may it be suggested that fuller value will be obtained from this book if it be read in conjunction with the Technical Communication mentioned in the footnote, which will be found to quote chapter and verse with quite relentless monotony.

G. St. Cl. F.

2065. Darlington, C. D., and Janaki Ammal, E. K. 575.17: 633/635

Chromosome atlas of cultivated plants.

George Allen & Unwin, London, 1945, pp. 397, 12s. 6d.

The very rapid advances made during recent years in the science of genetics, particularly in the study of the chromosome numbers of plants and their bearing on the older methods of systematics and classification, has made available to the student and research worker a vast fund of information on the genetical and cytological interrelationships of a very great number of plants. Much of this information lies scattered through a wide range of publications not always readily available to the enquirer and often in languages not generally understood. The need for some authoritative work of reference in which all the known chromosome numbers would be collected and systematically arranged within the covers of a single book has been generally recognized, and Drs. Darlington and Janaki Ammal have here performed an invaluable service to all those interested in genetics and cytology, particularly in its relation to what has been aptly described as the "new systematics ". The authors very modestly describe it as a first rough attempt to meet the need for the most precise and comprehensive knowledge of the conditions of breeding behaviour in the plants that matter in the organization of future research. Perhaps the scope and content of the book cannot be better summarized than in the words on the dust cover. " The

* American and foreign work is fully described in " Spring frost damage in orchards and its possible prevention ". Imperial Bureau of Horticulture and Plantation Crops, Tech. Commun. No. 15, 1945, pp. 22, 1s. 6d.

chromosome numbers of some 10,000 species of the most useful plants, economic, decorative and instructional and of their wild relatives and ancestors have been assembled; it constitutes in effect a world list of the known chromosome numbers of flowering plants. The introduction shows how these discoveries—some original and most published since 1930—reveal the origin of cultivated plants and the means that are now available for their improvement. The importance of the chromosome numbers to the systematic botanist is clear from the new classification (undertaken in conjunction with the authorities at Kew Gardens) which has been developed out of them and is now published as the basis of their arrangement. The popular names and economic applications are catalogued and there is a full bibliography. The book will be of service for teaching and research in economic and systematic botany, horticulture and plant breeding." H.M.T.

2066. INSTITUT FRANÇAIS DU CAOUTCHOUC. 633.912
Le caoutchouc d'hévéa. **(Production and use of *Hevea* rubber.)**
Institut français du Caoutchouc, 42 Rue Scheffer, Paris XVI, 1945, pp. 159, bibl. 22, 400 fr.

A very complete account of the methods employed in the production of *Hevea* rubber in French Indo-China, this book should prove a standard work of reference for some time to come. Every phase of production from the fertilization of clonal seed to the final emergence from the factory of the finished product is dealt with in a style terse, yet sufficiently descriptive to make clear all that is necessary over a very wide field. Many really excellent photographs supplement the text. Part I serves as an introduction to the rest by discussing rubber and rubber-bearing plants in general. A collection of photographs illustrating the more important rubber-bearing plants is of considerable interest. The following are represented: *Manihot glasovii, Ficus elastica, Castilloa elastica, Funtumia, Landolphia,* guayule (*Parthenium*) and *Taraxacum kok-saghyz.* Part II opens with a couple of pages on the collection of wild rubber in America and Africa and then settles down to the main theme, the cultivation of plantation *Hevea* and the preparation and treatment of the raw material up to the moment of export. The third of the three chapters which make up Part II describes arrangements for the well-being of the labour, both native and European, on what seems to be a somewhat lavish scale, including the provision of theatres and sports grounds in addition to hospitals, temples and baths. It is explained, however, that locally labour in Indo-China is scarce and has mostly to be imported from Annam and Tonkin. Part III deals with the industrial uses of rubber. For this bureau the chief interest of the book lies in its account of the plantation routine and in this respect it will be found fully up-to-date as regards the application of the results of recent research in other countries. Diseases of *Hevea* are dealt with fairly comprehensively though purely from the planter's standpoint, that of recognition and prevention or cure. Whether the fact that these diseases, lacking apparently any French equivalents, are spoken of throughout by their English names testifies to our progress in research or reflects on the state of our plantations is a question which need not be argued here. The general production of the book is considerably better than might have been expected from wartime France, in fact it compares very favourably, especially as regards the clarity of the illustrations, with many a pre-war product from that country. Furthermore, it is properly bound.
G. St. Cl. F.

2067. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING. 631.3
Agricultural Engineering Record,
1945, Vol. I, No. 1, pp. 32, 1s. 1d. post free from N.I.A.E., Askham Bryan, York, or H.M.S.O., Kingsway, London, W.C.2.

We welcome this new quarterly on an all-important subject about which all too little of value is published in this country. Its avowed purpose is to place on record for the benefit of manufacturers and farmers results of the work of the N.I.A.E., the progress of other development and research workers and observations of practical farming. The first number is of more interest to the agriculturist than the horticulturist, but in these days when composting holds the field the information given in an article entitled, A coulter for ploughing in straw, will interest all. Might we, as perhaps a pot to a kettle, suggest that its excellent interior is not enhanced by quite the dullest cover imaginable. Surely any one of the quite ordinary illustrations within would attract the eye more alluringly than the present cover, which looks for all the world like an advertisement for gramophone records ?

2068. SIMONS, A. J. 635.1/7
The vegetable grower's handbook. Vol. I and II.
Penguin Books Ltd., Harmondsworth, Middlesex. (Penguin Specials **S.146** and **S.147**), 1945, pp. 224 and 224, 9d. each.

These volumes form a very valuable addition to the previous works on horticulture published as " Penguins ".
The first concerns preparations for growing vegetables including cultivation of the ground, manuring, sowing and planting, cultivation in greenhouses and frames, pests and diseases. In the second is discussed the management of specific crops grouped as follows:—peas and beans, roots, onions and leeks, cabbage family, salad crops, tomatoes and cucumbers, potatoes, mushrooms, miscellaneous, and herbs.
The author is a master of condensation and his 20 pages on " preparing the ground " and " improving the soil " will be found to give all the information normally dispersed, not so clearly, over several volumes.
Naturally there are statements with which we should not all agree. Thus the reviewer does not consider that Epicure is only worth eating as a new potato. In his opinion it is tolerated early only because it gives a heavy crop, whereas in point of fact it improves with age—though possibly this may be a question of soil. Again the author recommends the same cultural treatment for summer and autumn cauliflowers as for those which mature in late winter and spring, usually termed cauliflower and broccoli respectively. Surely the cauliflower should be grown on rich well-worked soil to grow quickly, while the broccoli, which has to stand the winter, will need a very firm and rather poorer soil ? Although the first feeling one gets is that these books are too crowded, a second reading shows the subject to be nicely covered without omissions and without padding. They are obviously intended for the amateur, and yet there are very few gardeners who would not benefit from a study of them.
H.C.C.

2069. VERDOORN, F. (Editor). 581.9(8)
Plants and plant science in Latin America.
Chronica Botanica Co., Waltham, Mass., and Wm. Dawson, London, 1945, pp. 381, $6.

This is quite the most exasperating book imaginable. An Englishman opening it at random may well marvel at its unwarlike paper, its beautifully reproduced black and white plates and its remarkably low price and he may at once chance on an absorbingly interesting article by an expert and thence pass to one no less compelling. But sooner or later he will want to tap some particular item of information and that is where the fun begins, for he will find no index. There is indeed a very full table of contents interleaved with charming plates and stretching over 20 pages, and from this and with infinite patience he can probably dig out what he wants on a particular crop in a particular country, but the process is likely to be exhausting and irritating. Nor will he be at all impressed by the naïve caption at the top of the table of contents which runs as follows:—" As it was not feasible to prepare a subject index for our polyglot volume,

it is important that every reader examine this table of contents with some care ". Qui s'excuse s'accuse !

We must then suppose that the work is meant exclusively for libraries or for such as have secretaries to dig out information for them, or even perhaps its aim is to provide work for information bureaux. Once that idea is accepted, there is plenty to commend in the book. For it does contain, largely in English, a mass of useful information on the economic plant resources of most of the Latin American States including Mexico, such as has certainly not been available under one cover before. And, although the information is patchy inasmuch as sometimes it refers specifically to particular crops, sometimes more generally to types of vegetation, it is generally obvious that the persons responsible for the different articles do really know what they are writing about and have much of value to impart. The titles of a few articles may serve to indicate the scope of the book: Some problems of tropical American agriculture; Principal economic plants of tropical America; Plant Pathology in Mexico; The vegetation of Honduras; Plant resources of Cuba; Les conditions écologiques, la végétation et les ressources agricoles de l'archipel des petites Antilles; The natural resources of Surinam; A Agricultura no Brasil; The Brazilian forests; Notes on the vegetation and plant resources of Chile; Hevea rubber culture in Latin America; Notes on cinchona culture; The production of essential oils in Latin America; On fruit production in South America; Some of the principal Latin America plant science periodicals. All the above and many more are in Part I. Part II, about 90 pages, contains thoroughly revised reprints of articles already published in Chronica Botanica, dealing with much the same subjects. A special supplement contains a list of plant science institutions, gardens, societies, etc., in Central and Southern America.

Whether indexing would disclose serious lacunae, the present reviewer simply does not know. He has enjoyed the illustrations, has browsed pleasurably along strange vegetative paths in Venezuela and elsewhere, and he just hopes he will find the answers to specific questions if asked. At all events he is ordering a copy for the library.

2070. WHITEHEAD, G. E. 631.4: 634/635

Soil sense for green gardeners.

A. & C. Black, London, 1945, pp. 98, bibl. 6, 3s.

There is not much of this book but there is enough. Enough, that is, for Mr. Whitehead in this, the fifth of his series of garden " micro-tomes ", to provide his public of green gardeners, as he calls them, with a succinct address on the subject of the proper management of soil. But why green gardeners only ? We could name a number in the sere and yellow class who could also profit if they would ! In under one hundred pages of admirably clear print the author contrives to treat most adequately of a host of important matters based on soil management as it affects horticulture and, it might be added, the horticulturist, for the latter is by no means encouraged raptly to gaze while Nature does the work. He takes for his text a quotation from Dekker to the effect that " Honest labour bears a lovely face ", an encouraging thought that the verdant horticulturist may presently need, for it soon becomes clear that his mentor is an active non-adherent of the surface-scratching school. Indeed the description of bastard trenching, or mock trenching as it is called here with what the perspiring gardener may consider to be unnecessary refinement, does little to invest the proceedings with glamour. A " few dozen " journeys the length of the plot with well-laden barrow are uncompromisingly pronounced to be really necessary before the trenching (2 ft. deep) can begin in earnest. The complications of this operation, simply as they are here explained, are none the less likely to furrow the brows of the greener gardeners; and here a diagram or two might well have helped to point the way. The chapter on lime clarifies quite a number of matters on which there often exists, and not only among amateurs, a certain nebulosity of thought; besides, it is well worth reading if only for the information that there exists a gardener who is wont to keep frost from his greenhouse by watering a heap of unslaked lime deposited therein. In the matter of humus Mr. Whitehead is an enthusiastic though not a rabid composter. Methods of compost making for large and small gardens are described. Organic manures are discussed and there is a useful note on the properties of the various kinds of peat. In the chapter on artificial fertilizers many of the forms in which the elements N, P and K are offered to the horticulturist are reviewed and evaluated. In a further chapter the manures and fertilizers used in the chief branches of horticulture and the times of their most effective application are discussed, nor is the question of mineral deficiency forgotten. Minor operations are dealt with in some detail, in particular the preparation of seed beds. The theories of the anti-hoeing faction are considered and dismissed as not proven. The principal soil types are described, and methods of treating each to obtain the best results are outlined. As the author remarks, the majority of gardeners have to deal with unbalanced soils, but he claims that persistent treatment of the right sort can turn a garden from a nightmare into a startling success. After reading his book it is easy to believe him. G. ST. CL. F.

2071. ARKANSAS. 634/635(767)

Fifty-third, -fourth and -fifth Annual Reports of Arkansas Agricultural Experiment Station for the fiscal years ending June 30, 1941, 1942 and 1943,

pp. 47, 55 and 39.

These are all popular reports of progress made in different directions including emergency war production. The last report includes surveys of achievement of greater production over a period of 55 years as the result of research into problems of field and food crops, plant diseases and plant pests.

2072. BARBADOS. 634.651 + 633.68 (729.86)

Annual Report of the Department of Science and Agriculture, Barbados, for the year ending 31st March 1944,

pp. 14.

It is noted that attempts are being made to propagate pawpaws vegetatively by the removal of rooted side shoots and marcottage. Chemical investigations include manurial trials on sweet potato, yams and cassava.

2073. BRITISH HONDURAS. 633/635(728.2)

Annual Report of the Department of Agriculture, B. Honduras, for 1944,

pp. 10.

Efforts are being made for increased production of food for local consumption. A prerequisite is the education in good husbandry of the peasant. Lists of exports in 1944 show that coconuts were most important, their value being estimated at $138,535, followed by grapefruit pulp $89,064, bananas $86,328, with the rest nowhere.

2074. GEORGIA. 634/635(758)

51st, 52nd, 54th and 55th Annual Reports of Georgia Experiment Station for the years 1938/39, 1939/40, 1941/42 and 1942/43,

pp. 97, 93, 111 and 75.

These reports, which have just come to hand, give brief notes on results of different trials, but for useful detail reference is necessary to the relevant bulletins, lists of which are included in each report. The 53rd and 56th reports have already been noted in *H.A.*, 12: 326 and 15: 1349.

2075. D.S.I.R. NEW ZEALAND. 634/635 + 664.84/85(931)

Nineteenth Annual Report of the Department of Scientific and Industrial Research, New Zealand for 1944/45,

1945, pp. 65.

Reports of Research Committees. Fruit cold storage.

Sturmer apples showed excellent keeping quality under 3 different atmospheric conditions and temperatures varying from 37-38° to 39-40° F. Jonathan spot was completely controlled over a period of 30 weeks by storing in an atmosphere of 7% CO_2, 14% O_2 and 79% N and fungous infection was largely prevented, the quality and appearance of the fruit being, moreover, superior to that of ordinary cool stored fruit. A detailed report is being prepared on the effect of delayed storage on Granny Smith apples. It may be noted that in the 3 years of this trial oiled wraps prevented scald from appearing during the normal storage life of the fruit. Core flush in Granny Smith was less on apples from trees worked on E.M. stocks XII and XVI than on those from trees on Northern Spy, Large's Seedling and Ivory's Double Vigour. Notes are given of further results of fertilizer trials on Cox's Orange Pippin and 4 other varieties. The storage quality of coloured strains of Delicious, Cox's, Jonathan and Dougherty was, generally speaking, inferior to that of the standard varieties. Trials at Appleby continue to indicate the better keeping qualities of apples on the E.M. stocks than on Northern Spy.

Fruit research. Long-term manurial trials, now in their 14th year, on Moutere Hills soils at Appleby, are giving evidence that the use of N alone may cause decline and render trees liable to fungal attack. Results with particular varieties are indicated, as also those from short-term trials. In apple rootstock trials now in progress for 10 years it is obvious that the effect of a given rootstock may vary with the scion worked on it. Individual differences are noted between performances of different varieties on the various E.M. and Northern Spy stocks. Growth and yield trials of Sturmer, Jonathan, Cox and Dougherty on a wide range of stocks are being continued under the Plant Diseases Division, Auckland, E.M. XII maintaining its position as the most vigorous stock irrespective of scion variety. Of apple varieties Laxton's Exquisite, Laxton's Fortune and Ellison's Orange are showing promise as early dessert varieties to precede Cox. Monarch is the most promising of the cookers. Twelve new varieties of peach have during 5 years' growth shown almost complete immunity to leaf curl. The most promising new citrus varieties are Kara mandarin, several tangelos and the Wheeny grapefruit. Of stocks for Washington Navel orange, sour orange has proved incompatible, while *Poncirus trifoliata* has hastened flower formation and citronelle and sweet orange have produced the largest trees. Also in Auckland trials D.D.T. proved successful against grass-grub beetles on fruit tree foliage, carrot aphids, white butterfly and diamond-back moth and codling moth, but was quite ineffective against red spider, which increased considerably following treatment. Fermate gave encouraging results against apple scab. Peach blossom infection by brown rot was materially reduced by spraying with relatively high dosages of lime-sulphur spray at blossoming. Spraying peach trees which showed mottle leaf, defoliation and loss of vigour, with manganese sulphate and hydrated lime in 1943/44 and 1944/45 resulted in return to healthy appearance and vigour in 1945. Adequate control was obtained of soft-wax scale by one application of 3% certified summer oil. Increased yield of raspberries followed the control of bud-moth, cane spot and septoria spot by 4 applications of bordeaux plus lead-arsenate. Grease-spot and brown spot of passion fruit was controlled by bordeaux spraying. Preliminary, highly satisfactory trials were carried out on the dehydration of pears, peaches and nectarines.

Plant chemistry laboratory. Work is reported on dehydration of potatoes, cabbages, carrots and beetroots, apples, pears and peaches.

Plant research bureau. The botany division reports work on phormium, linen flax, seaweed utilization, kok-saghyz and other plants.

Tobacco research. Fertilizers, diseases, seed production and curing are the main objects of research.

Cawthron Institute. Tomato investigations have embraced soil treatments and " cloud ". In the control of magnesium deficiency in apples, dolomite has consistently given more lasting benefit than magnesium carbonate and particularly than magnesium sulphate. Investigations on magnesium deficient apple trees show the necessity for care when sampling leaves. Thus magnesium is found to be at a minimum in the lower leaves and to rise gradually up to the tip leaves. Moreover, a marked inverse correlation is found to exist between magnesium and potassium contents of the dry matter of apple leaves. Thus, whereas in potassium-deficient leaders magnesium averaged 0·3% while potassium varied from 0·1% to 0·46%, in magnesium-deficient leaders, while magnesium varied from 0·04% to 0·37%, potassium varied from 2·5% to 0·5%. The figures for healthy leaves were Mg 0·08% to 0·42% and K 1·3% to 1·0%. Vitamin C determinations in apples are being continued and figures are given for Sturmer, Granny Smith, Delicious and Statesman. Dieback in apples is under investigation. Apple rootstock trials continue, the stocks including Northern Spy, E.M. I, XIII and XV, Double Vigour and a local, vegetatively propagated seedling.

2076. NYASALAND PROTECTORATE. 633.72 + 633.85(689.7)

Report of the Department of Agriculture of Nyasaland Protectorate for 1944, Part II, Experimental Work, pp. 12.

A curtailed experimental programme has given some very interesting results. *Tea.* Some of the trials are beginning to yield results. (1) Work on China jat pruning and tipping suggested a significant increase in yield from tipping 2 inches above the pruning level as against a 4 or 6 inch tip. There was no significant difference in the yields of clean prune as against cut-across prune. (2) Yearly bush pruning of Indian jat is found significantly to reduce yield and to retard the spreading of the bush. (3) There are indications that young tea responds to hard pruning. So far light plucking at 9 months and onwards and pruning for the first time at 30 months has proved the most successful treatment. (4) Results of spacing $3\frac{1}{2} \times 3\frac{1}{2}$ ft., 4×4 ft. and 5×5 ft. suggest, 5 years after being laid down, that the closer the spacing the higher is the yield. (5) Manurial experiments have, as yet, not given conclusive results and this applies too to cultivation trials. Nor has the treatment of nursery bed with various inorganic and organic fertilizers led to any startling results. (6) Watering trials showed the advisability of daily watering as opposed to no water or only once a week. (7) Seed spacing at 6×6 inches gave a greater number of plants for planting out at 18 months than 9×9, 9×6 and 6×3 inch spacing. (8) Selection of high yielding bushes continues. *Tung Experimental Station. Aleurites fordii* having been found unsuited to Nyasaland conditions, attention is now concentrated on *A. montana.* Vegetative propagation experiments are in progress with clones budded on seedling *montana* and *fordii* stocks being tested against selected and unselected seedling *montana* trees. Both types of seedling have proved more vigorous and the buddings on *montana* are more vigorous than those on *fordii* stocks. On the other hand the buddings have given significantly greater yields than the seedlings. Despite the seedling stocks, certain characteristics of the mother trees are noticeable in the growth of the clonal material, and 2 distinct types of habit can be recognized. Clonal differences in flowering habit are also evident and are being investigated for possible correlation with yield. A thinning trial is in progress. Topworking has proved successful and the best methods of doing this are being worked out. Cultivation and manurial trials are in progress.

2077. RHODE ISLAND. 634/635(745)

Fifty-seventh Annual Report Rhode Island Agricultural Experiment Station for 1944, 1945, pp. 39, being Contribution **674**.

Erosion in peach orchards has been checked by contour

planting combined with a cover crop for winter protection. There are indications that packing apples in solid rather than ventilated boxes will result in reduced water loss. Success against apple scab is reported by the use of Isothan Q 15 (lauryl isoquinolinium bromide). This was found compatible with lead arsenate and nicotine sulphate and gave no discomfort to the user. It is considered the best non-metallic apple scab spray. An organic, mercury-containing spray, Puratized N_5-D, at 1: 20,000 in water provided almost complete control of scab in 1943 trials. Pre-storage treatment of Rhode Island Greening apples with high concentrations of CO_2, viz. 30%, 60% and possibly others, gave promise of controlling storage scald. Cover cropping vegetables in rotation+manuring promises increased returns. Onions yielded better after grass than after mangolds, buckwheat or corn, results being closely related to organic matter accumulation in the soil. Different varieties of the same vegetable showed greatly different vitamin C and carotene contents.

2078. Southern Rhodesia Department of Agriculture. 63(689.1)
Report of Secretary, S. Rhodesia Department of Agriculture and Lands for 1944.
Rhod. agric. J., 1945, **42**: 323-44.

Points of interest to horticulturists will be found under two or three headings. *The dehydration industry.* A factory was established in 1944 at Umtali and was working in November while another, also under government control, was in process of establishment at Salisbury. Each of these factories and a third set up by Liebig at West Nicholson is capable of handling 10 to 15 tons of raw produce a day. They should considerably help vegetable producers. *Tobacco industry.* A difficult season was experienced. The areas planted to different types of tobacco were:—Virginia 60,543 acres, dark fire-cured and air-cured 1,584 acres, Turkish 7,087. *Horticulture.* The Sub-Tropical Experimental Station at Umtali has increased its acreage to 360. Work continues on the cultivation of fruits and berries. The nursery section is registered for the sale of planting material. Advice is given on the growing of vegetables for the dehydration factories.

2079. Wädenswil (Kobel, F., and others). 634/635(494)
Jahresbericht 1944 der eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil.
(Annual report of the Swiss Horticultural Experiment Station at Wädenswil for 1944.)
Landw. Jb. Schweiz. 1945, **59**: 159-75.

(1) *General.* The reorganization of the Experiment Station decreed in July 1941 has given greater independence to the several sections and thereby increased their efficiency. (2) *Physiology and breeding.* The chief breeding aim in fruit growing is the production of dessert apples with good keeping properties. In spring 1944, about 2,000 seedlings from crosses were grafted on E.M. IX rootstocks at Oeschberg and about 500 on seedling rootstocks at Wädenswil. In viticulture, the production of an early, prolific blue wine grape is aimed at, while the breeding work in respect of valuable own-rooted vines continues. Vegetable breeding was mainly concerned with onion and dwarf bean varieties. A new variety of *Primula malacoides*, characterized by velvety, brown-purple flowers, has been released. The new subsection for physiological chemistry concentrated on vitamin behaviour in frozen and canned preserves. The use of hormones in vine grafting continued to be studied. (3) *Plant protection.* On the mycological side trials for the control of *Botrytis* rot of grapes were initiated, while the study of other fruit diseases was carried on. The entomologist reduced infestation of *Chortophila cilicrura* in runner beans by applications of 300 c.c. 1% Gesapon per bean pole from 15% to 7%. A single application of 2% Gesapon on 14 July failed to control carrot fly; two applications of 1% Gesapon (4 litres per square m.) at the end of June and the beginning of August are therefore recommended. Winter spraying of own-rooted vines with fruit tree carbolineum proved a full success against heavy infestations of gall-forming *Phylloxera*. It is suggested that the treatment should be made compulsory in regions where this pest occurs. (4) *Chemistry and biology of beverages.* The report covers various research schemes on wines and fruit juices. (5) *Fruit growing.* Apart from breeding new varieties (see No. 2) the evaluation of local and foreign varieties is one of the main objects of the section. For the preliminary apple trials at Wädenswil and Oeschberg two trees on E.M. I, II and IX are now being used for each variety. This will simplify the comparison with strains bred at the Station. About 16,000 walnuts from selected trees were made available to nurseries and other steps are being taken to promote the growing of first-class walnuts on a large scale. (6) *Viticulture.* Work on the different schemes in hand has been continued. (7) *Vegetable growing.* The results of some variety trials with kohl rabi and runner beans are briefly reported. (8) *Fruit and vegetable storage.* Fruit and vegetable storage trials carried out in 6 air-cooled cellars, as developed at Wädenswil, in different parts of the country have given further proof of the usefulness of the design.* A list of publications concludes the report.

2080. Imperial Bureau of Horticulture and Plantation Crops. 634.1/8-2.111
Spring frost damage in orchards and its possible prevention.† With foreword by Prof. E. J. Salisbury, F.R.S.
Tech. Commun. Bur. Hort. Plant. Crops **15**, 1945, pp. 22, bibl. 74, obtainable from I.A.B., Central Sales Branch, Penglais, Aberystwyth, 1s. 6d. post free.

In the present review an attempt is made to weigh up the various internal and external factors which affect frost resistance, to consider and evaluate the many devices proposed for the prevention or mitigation of damage and to discuss the lines on which future work appears most promising.
Suggestions are tentatively made for concerted investigational work by pomologists and meteorologists which would appear to offer reasonable hope of ultimate success.

2081. Roach, W. A., and Roberts, W. O. 581.111: 632.19: 634.1/7
Further‡ work on plant injection for diagnostic and curative purposes.§
Tech. Commun. Bur. Hort. Plant. Crops **16**, 1945, pp. 12, figs. 9, bibl. 7, obtainable from I.A.B., Central Sales Branch, Penglais, Aberystwyth, 1s. 6d. post free.

In 1938 Dr. Roach surveyed the whole field of plant injection and gave details of the technique used by himself and others in Technical Communication 10. Since then considerable advance in technique has been made. In the present paper an account is given of the improvements achieved by the East Malling team and a summary of experience with 25 different kinds of plant, mainly fruit and vegetable species, is provided.
An improved method for injecting solids into a tree for curative purposes is described and illustrated. This method ensures the minimum of mechanical damage.

* *Schweiz. Z. Obst-u. Weinb.*, 1943, 52: 589-92; *H.A.*, 14: 937 (4).

† See also abstract 2064.

‡ For previous work see Plant injection for diagnostic and curative purposes. *Tech. Commun. Bur. Hort. Plant Crops* 10, 5s.

§ Reprinted by courtesy of the Editors of the Journal of Pomology from *J. Pomol.*, 1945, Vol. 21, pp. 108-19. H.A. 15: 529.

2082. The following reports have also been examined:

a *A.R. Basutoland Dep. Agric. for report year ended 30th September, 1943,* pp. 16.

b *58th A.R. Nebraska agric. Exp. Stat. for 1944,* 1945, pp. 125.

c *65th A.R. New Jersey agric. Exp. Stat. for 1943/44,*
(Farm Science in War and Peace), 1944, pp. 64.

d *A.Rs. New Zealand Dep. Agric. for 1941/42,* pp. 12 *and for 1942-43,* pp. 12, 6d. each.
N.B.—Just received; for 1943/44 report see *H.A.*, 15: 383.

e *A.R. Puerto Rico agric. Exp. Stat., Rio Piedras, for 1940/41,* 1942, pp. 70.
N.B.—Just received; for later reports see *H.A.*, 14: 423 and 15: 386.

f *A.R. Field Experiments on Sugar Cane in Trinidad for 1944*
(Bain, F. M.) [including The sugar cane variety situation in 1944 (Bain, F. M., and Ross, R.)].